# MODEL AIRPLANE NEWS

25 CENTS
SEPTEMBER 1948

Don McGovern and His Glider Towing Gassie
(See page 10)

## FULL SIZE PLANS FOR SCALE CO2 WEE WACO

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EXTRA FAST DRYING
Strong!
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ROCKFORD, ILLINOIS
TESTORS
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Cement
FORMULA B
MEDIUM FAST DRYING
Strong!

THE AIRCRAFT INDUSTRY is back in business! After nearly three years of stretching their operations to the breaking point in an attempt to "hold on" until military procurement in quantity began again, the industry has now received $1,998,800,000 in contracts for construction of 3366 military aircraft. As was expected, the great majority of these orders went for aircraft already in production, some since before V-J Day, although at least one "paper" airplane (North American T-28 trainer) was ordered in quantity and several types have only a prototype under test, notably the Curtiss-Wright XP-87 and Grumman XF9F-2 *Panther* fighter.

NORTH AMERICAN Aviation Inc. has walked off with the cream of the orders including a total current order for 676 F-86 swept-wing fighters, which have already exceeded the speed of sound in dives and, many believe, in level flight. In addition to an award for 225 F-86A models made last year, the new contracts are for 333 more F-86A and 118 F-86C. The fast fighter, which Air Force has already admitted has a top speed of over 650 mph (world's speed record is only 650.8 mph in the Douglas *Skystreak*), will be powered by the new General Electric J-47A (TG-190) axial-flow turbojet engine rated at 5000 lb. static thrust and capable of up to 6000 lb. With this new engine observers are confident the F-86 will be capable of supersonic speed in level flight, and quantity production will give the U. S. the first supersonic fighter force in the world. North American also received an order for 266 new trainers of a design which recently won an Air Force competition over about a dozen other entries. The T-28 is still on paper, although the prototype is being built, and is intended to replace the primary, basic and advanced trainer types by combining them all into one airplane. Air Force says cadets will be able to step from the T-28 directly into the jet-propelled TF-80 jet trainer, which is the same thing as stepping directly into a jet fighter. The company also came away with an additional order for its four-jet tactical bomber with its current contract for 135 B-45's being increased by 51 model B-45C. North American is also hard at work on the XAJ-1 and XA2J-1 Navy turboprop and turbojet-powered dive-bomber attack planes.

ONE OF THE SURPRISES in the orders was an award for 30 Northrop B-49 eight-jet *Flying Wing* bombers, the most powerful airplane in the sky. The huge plane has the equivalent of 32,000 hp at 375 mph cruising speed and 500 mph top speed. The order came only a few days after one of the two prototype YB-49 wings had crashed and burned in the Mojave Desert after a test flight from Muroc Base. It was reported that the YB-49 has remained aloft for 9 hours, the longest endurance of any jet airplane ever built. At a cruising speed of 430 mph, with which the YB-49 is credited, this would bring the range of the huge craft to 3870 miles, close to its 4000-mile rated range. Northrop still has ten YB-35 propeller-driven *Flying Wings* to deliver, but these have been delayed for conversion of the counter-rotating design to single rotation propellers.

BOEING B-50 is slated as the standard strategic bomber of the U. S., and Air Force has ordered 132 B-50D and 30 B-50C models in addition to the present contract for 215 B-50's bringing the total to 376. The B-50C will actually be a much later model of the airplane than the B-50D, oddly enough. The B-50C will be equipped with four Pratt & Whitney R-4360 VDT engines, which are now under development. This engine is similar to the standard turbo-supercharged *Wasp Major* used in the B-50A but varies in that the turbo is geared back into the engine crankshaft. A substantial portion of the exhaust energy is dumped overboard through the waste gate of the conventional turbo because it is not needed to provide the compression required for high-altitude operation. By gearing the turbo back into the engine, this heat energy is put back to useful work in providing engine power in addition to providing compressed air for the carburetor. By this method, fuel consumption is decreased (which means range is increased) from 20 to 30%, a considerable gain at no increase in fuel load. The superspeed XB-47 Boeing bomber was not ordered in the current program for a number of reasons, including Boeing's capacity being used up in B-50 production and B-29 conversion program and the fact that the XB-47 is still an experimental airplane. But Secretary of Air Force Symington intimates the swept-wing B-47 is definitely in the fiscal 1950 program and for a substantial amount.

NEW ENTRY INTO THE airplane picture is Curtiss-Wright XP-87 "all-weather" fighter. Total of 58 F-87 models and 30 RF-87A models was ordered under the new program. The RF model is designed for long range photo-reconnaissance work, while the F-87 is the standard all-weather fighter version. The prototype, now undergoing flight tests at Muroc field is equipped with four Westinghouse 24C engines of 3000 lb. static thrust each, a total of 12,000 hp at 375 mph. However, these engines are being changed to two General Electric TG-190 engines of 5-6,000 lbs. each, which will provide approximately the same power but in much slimmer and lower drag nacelles. Rumor has it that the RF model may be powered by Allison J-33 centrifugal-flow jet engines of the type used on the P-80.

OLD STANDBYS continue to lead the parade in the fighter class with Lockheed getting the nod for 457 P-80C and 128 TF-90, two-man version of the 600-mph jet fighter. The new "C" model is powered by an Allison J-33-23 engine with a new, higher rating of 4600 lb. static thrust, compared to the flat 4000 of the P-80B model airplane. This engine is the popular Allison "400," was recently granted an Approved Type Certificate by CAA, licensing it for commercial installation in jet transport planes. Republic's slim, fast P-84 *Thunderjet* was also given a boost with a contract for 409 P-84C fighters. This new model, already in production, will use the new General Electric TG-190 engine with its increased thrust. Present P-84C's are being delivered with Allison-GE J-35 (TG-180) engine installed because the new TG-190 engines are not yet being delivered in sufficient quantity. The conversion will be made at a later date.

NAVY FIGHTERS are going to have the "new look" according to the Bureau of Aeronautics list of contracts. For example, Navy has ordered 28 Douglas F3D and 19 Vought F7U types, both of which are still under heavy wraps. The Douglas fighter is the Navy counterpart of the Curtiss F-87—that is, a two-man side-by-side

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MODEL AIRPLANE NEWS

JAY P. CLEVELAND
Publisher

*Serving Aviation 20 Years*

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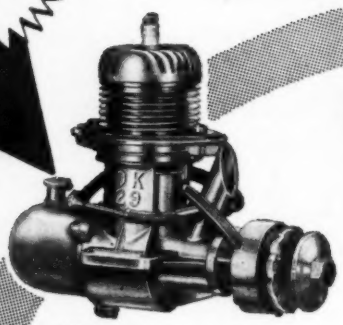
# "O.K." Consistent Winners



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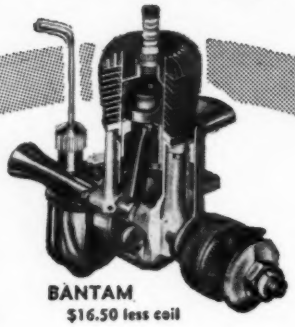

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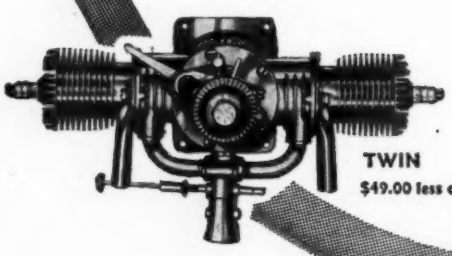

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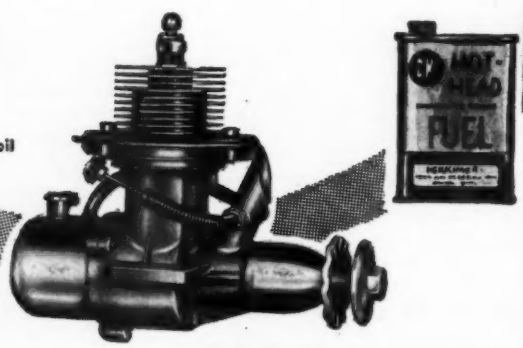


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| Super 29 | .299 | .760 | .660 |
| Super 60* | .604 | .900 | .950 |
| Twin | 1.208 | .900 | .950 |
| $CO_2$ | .0178 | .275 | .300 |
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record after record

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Class A, Open record time of 3:13.0 (3 flight average) established by Paul Salake, Hampton, Va. on December 8, 1947 with a Bantam.

CONTROL LINE
SPEED GAS MODELS
Class A, Senior record speed of 107.48 mph established by Maurice Stenglin, Dallas, Texas on February 10, 1948 with a Bantam.

COMPRESSED GAS
($CO_2$) MODELS
Combined class, Open record time of 14 min., 54 sec. (3 flight total) established by Joe Dodson, Hampton, Va. on March 4, 1948 with an "O.K." $CO_2$

CONTROL LINE
SPEED GAS MODELS
Class A, Open record speed of 97.47 mph established by John Kesserman, Knoxville, Tenn. on March 9, 1948 with a Bantam.

FREE FLIGHT GAS MODELS
RISE OFF GROUND
Class A, Open record time of 11:20:8 (total, 2 flights) established by Marjorie A. Watkins, Oakland, Calif., on April 11, 1948, with a Bantam.

And these are just a few recent winners announced by the AMA Contest Board . . . authentic proof that "O.K." consistently powers the champions. Watch this column in future issues for the latest records set by "O.K." powered models. So if you want championship performance, you're on your way when you say "O.K."

"O.K." ENGINES

# SCRAP BOX

By BILL WINTER

THERE almost wasn't a "Scrap Box" this month! Cal Smith, the illustrator-builder who made those new instruction-sheet sketches for Jim Walker's latest *Fireball*, handed us a kit with a few missing pieces and said, "Try this." Then Fred Schrott of Ohlsson, got us to try out a *23* on their Number Two glow-fuel. You know what happens when you get fired up on a new project. So here we are, late and with the "hunt system" of typing 50% shut down due to a careless bout with a spinning prop.

While on the subject of glow fuels, hot fuels in general, and home-mixed witches' brews, we've got a request to make. Fellows, when you have dope to pass along on this subject, be sure of your ground. Strobotac tests or consistently better times in flight should be enough for anybody. But if the fuel doesn't get results when tried by others who read about it, a lot of good guys get snafued. Joe Blight, *Atlantic City Sky Blazers*, who sent out an SOS to the Dallas boys for more info on their reported work with Benzol, has been experimenting with the stuff after reading of its use in the southwest, and has been getting poor results in *Madewells*, *Atwoods* and *McCoys*. Bligh has been mixing it 3 to 1, and 2½ to 1 with Bakers Castor Oil with 2-oz. of ether added per quart. It doesn't start well and kicks back viciously. With current off, power drops. Bligh says it also has too much carbon. "We did get the engines going on this stuff, but what is the sense of mixing it if it does not equal the performance of commercial fuels?"

Asked about this, Ohlsson and Rice report that they have a top flight chemist who states there is no scientific evidence to support the contention that benzol is superior to any prepared fuel. As to economy and availability, O & R tried to purchase benzol at 25 drug stores, both chains and independents. 15 did not handle the item, 2 sold on prescription only, and 8 sold benzol at 75c a pint, which is the price of prepared fuel. The retail cost of castor oil would have been 50c, making a total cost of $1.25 for 22 oz. of material.

TO ALEC PATERSON, Fort Frances, Ontario: If you keep breaking props on your stunt model, why not try a longer landing gear? Maybe your props are too big; try ten-inch diameter of six-eight pitch for that engine. Sure it isn't trimmed nose heavy? We'll ask the manufacturer if he can't supply the info you require. Paterson says Minneapolis and Winnipeg are the nearest large cities where he can get help and that he visits them very seldom. We'll be glad to help any other builders who live in remote spots (in the model world). Drop us a line and we'll try to get the proper authority to answer the question.

OUR A.M.A. RECORD file shows 27 new marks since our last report! Four of them, no less, were set by Lew Mahieu of Long Beach, Calif., who seems to have solved the seaplane problem with a vengeance. All three of his R.O.W. records were for robust times. In Class A Open, free flight, R.O.W., he had a three-flight total of 22:1; in Class C, 10:52; Class D, 8:8.6. All three records were set on May 16 at Los Angeles. Mahieu used his pet *Zeek* design in various sizes, with an *Arden .199* in A, a *K & B .32* in C, and a *McCoy 60* in D. All engines used

(*Turn to page 9*)

THE Mohawk Chief

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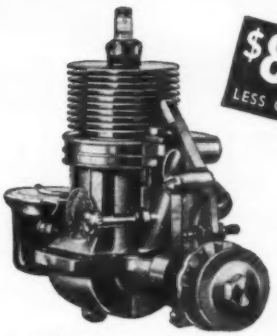

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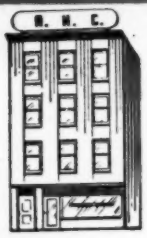


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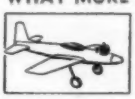
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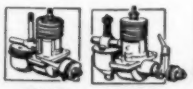
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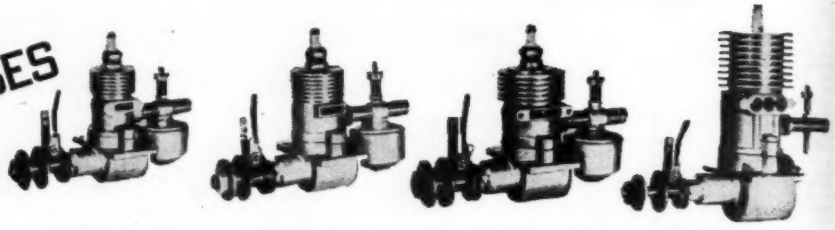

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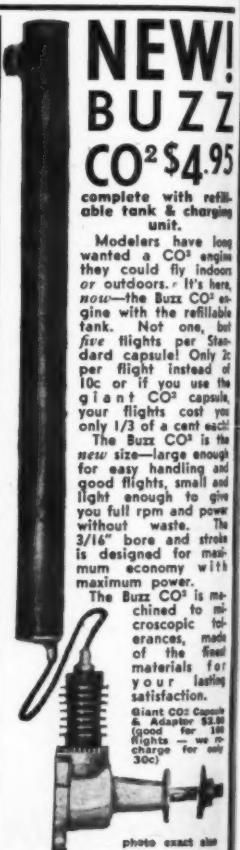

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(Continued from page 3)

Duramatic "hot plugs." A *K & B* fuel cut-off was used on the A job, along with an *Air-O* 9-in. prop; the C job, with single main float and two auxiliary floats under stab tips, used an 11-in. *Air-O*; the D job, with two floats forward and one under the stab, used a 12-in. *Air-O*. The C job had a span of 59 in. and an area of 527 (projected); the D job a 79 in. wing of 855 sq. in. On May 30 at Long Beach, Mahieu flew the D job, this time with single wheel and twin skids behind, to an R.O.G. record of 19:14.4.

There can be no doubt that California is the capital of American model building. 22 of these 27 records were set in that state. The famed Robbers family of Oakland knocked off three more: Donald Robbers, a 6:2.6 CO-2 mark with a 130 sq. in. model; Harvey Robbers Jr., 5:26.6 in Single Class Senior, Helicopter; and Harvey Sr., 6:39.6 in Single Class, Open, Helicopter. The McAllisters is another California family with a penchant for busting records. Leta (Mrs. David C. McAllister) ran up a 15:9 three-flight total with a *23 Zipper* in Class B. Open; and David Junior, 7:50.8 in Class B Junior, *K&B* .29-powered *Pacer*, with a loading of 13⅓ oz. per sq. ft. For the benefit of record fans, the following table gives new records not reported above:

| Name | Event | Time or Speed | Products |
|---|---|---|---|
| Frank Cummings | Indoor Stick Class C Open | 28:42.4 (best of three) | |
| Gary King | Free-flight Class D Jr. | 4:55 | Vagabond & Cyclone GR |
| Richard Enseki | Outdoor Stick Class C Sr | 9:15 | Gollywock |
| Richard Rigney | Control Speed Class B Sr. | 126.53 | McCoy 29, Duramatic Hot Point Plug |
| Robert O'Brien & E. H. Brewer (team) | Control Speed Class A Open | 109.71 | Arden. 199 |
| Richard Grandel | Control Speed Class D Jr | 130.38 | Duraplane Dooling "61" |
| Crosley Fitton | Control Speed Class B Jr. | 101.08 | O & R incandescent plug in McCoy 29 |
| Ralph Conn | Outdoor Tow Glider Class E Open | 23:24.4 (Total) | Jasco Floater |
| Andrew Petersen | Outdoor H.L. Glider, Class B Open | 19:32.8 (two flight total) | |
| Jack Sauer | Outdoor H.L. Glider, Class B Senior | 10:24.4 (two flight total) | |
| William Creany | Outdoor Glider tow launch, Class E Senior | 20:53 | |
| L. W. Haskell | Free flight Class A Open | 21:25.6 (total) | Arden .199, Testor 9-6 prop |
| William Atwood | Outdoor H.L. Stick Class D Open | 28:14.5 (total) | |
| Carl Wheeley | Free flight Class B Sr. | 4:36 (total) | 11 in. Air-O prop, Forster 29, |
| Fred Brening | Outdoor H.L. Stick Class C Jr. | 3:18.2 (total) | Monogram Prowler |
| Steve Jordan | Control Speed Class B Jr. | 102.23 | RB Special, Speedwagon |
| Crosley Fitton | Control Speed Class A Jr. | 92.08 | Arden .19, Arden Glow Plug, X-Cell prop. |
| Parker Hubert | Control Speed Class D Sr. | 134.88 | McCoy 60, Duramatic Hot Point plug |

SO MUCH FOR the records of the month, as so thoughtfully supplied by AMA headquarters. For the past two months we have been voicing our gloom over those terrific speed marks in U-control. With the trend toward 200 mph, we thought that rules should make it more difficult to design a ship capable of much more than, say 125 mph. Richard Coniglio, with one of those Army addresses that only the Army can figure out, disagrees. "I think it would be restrictive and injurious to model aviation," says Coniglio, "to secure the maximum acceptable speed to any one level. If, after years of experimenting, erring, correcting, studying, engineering, learning, a person is finally able to put together a ship which has an edge over competition, that person should be permitted to present his work for what it's worth, namely contest prizes." Well spoken, Dick, but we die hard.

First, we no longer fly free flight with unlimited gas, or even ¼ or ⅛ oz. per lb., and have made many other changes to boot. But it is just as tough to beat the other guy! And as to control line, it would seem that 125 mph would beat 124 mph just as much as 180 would beat 179 mph. Many fellows, no doubt, disagree with the notion that speed is getting pretty foolish. But, come, come. Only one squawk? Does this mean that we are agreed? That couldn't be—among modelers.

Robert Dager, who runs Dagers Hobby Shop in Dallas, Tex., tells us comments about Dallas modeling made in letters quoted here weren't on the ball. "I will try to set you straight on everything around here," promises Dagers. "Sam (Beasley) is in the 140's, with the '49.' He has held the Senior '49' class record for almost 18 months at 124 mph, but a few months ago upped it to 136 and no doubt will raise the record again soon. Bill Clem has also given the boys something to try at: 106 plus with a *Bantam* in the Open Class. Lots of the boys are using Glo-plugs here, just as, I guess, they are in the rest of the country. They were a boon to us fellows who were having troubles with ignition. However, there are still a lot of coil and condenser boys around, too. About Rev-up props and fuel, the toothpick props are really very good. With a stock 8-13, 130 mph on a *McCoy 49* has been run. By stock I mean no whittling of any kind was performed." Thanks, Bob Dagers, tell us more.

ALAN JORDAN, 23 Herbert St., Cambridge, England, would like to correspond with teachers who are model builders. Jordan has a class of 9 year olds. He is a teacher with a sense of humor and offers this cute story for the tall-but-true story of the month. "In 1940 I was flying an experimental job with 17" of flat wing and 9½" on each tip dihedralled at a 60° angle. It flew up a tree. The kid who recovered it said, 'It's all right, Mister, except the wing was bent. I straightened that for you!'" This is light and different, so we'll award this months free MODEL AIRPLANE NEWS subscription to Mr. Jordan.

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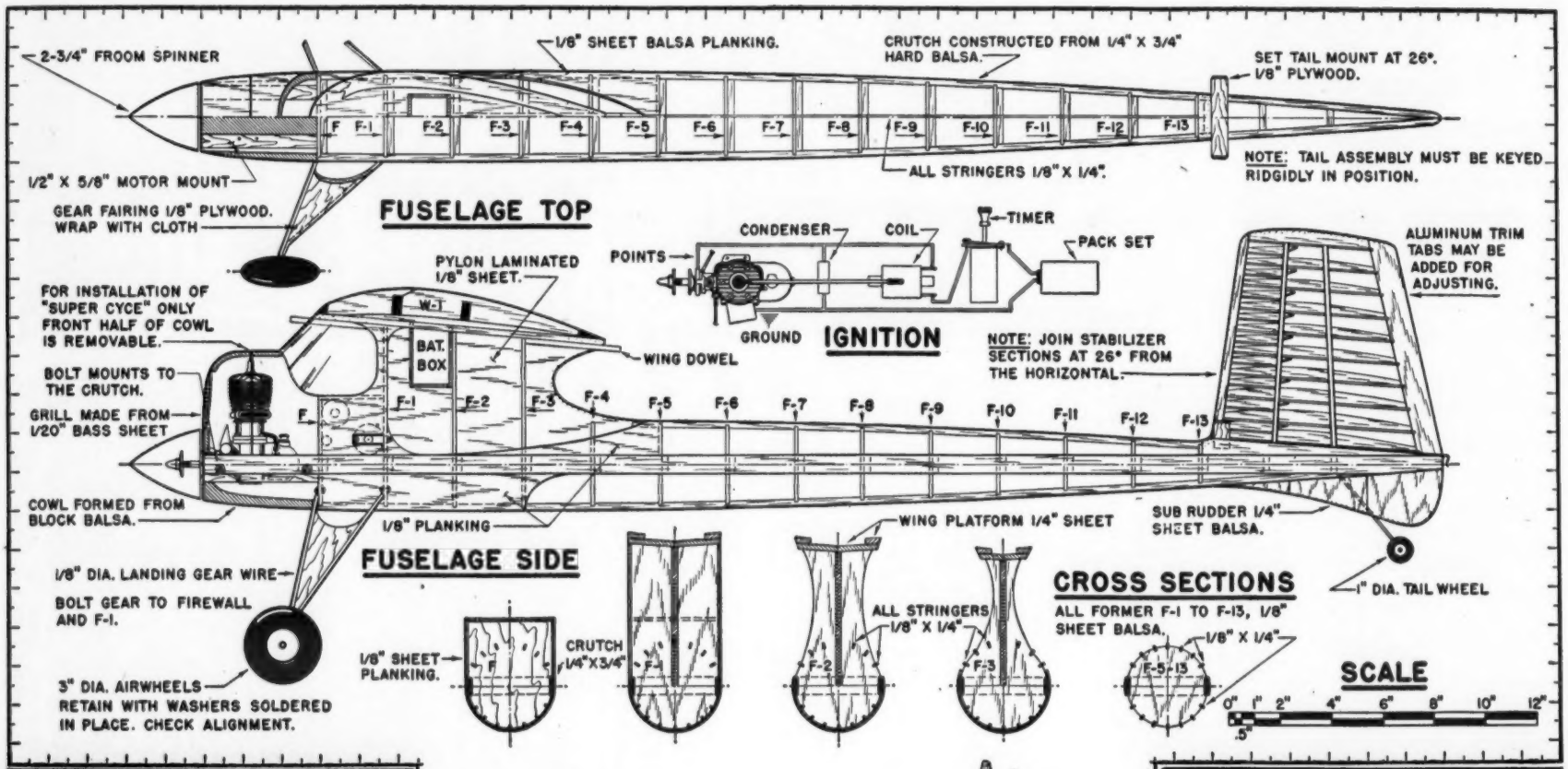
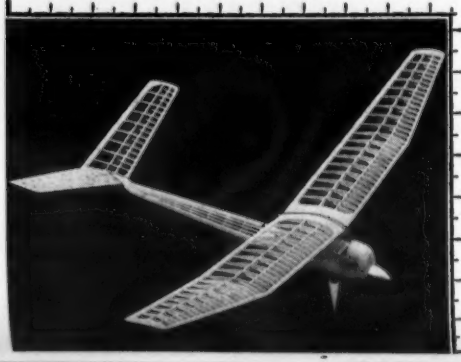
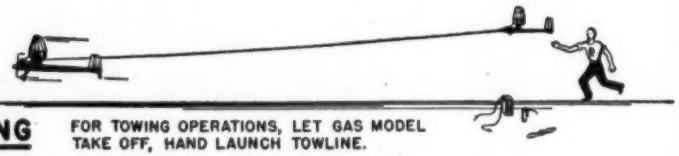

2-3/4" FROOM SPINNER
1/8" SHEET BALSA PLANKING.
CRUTCH CONSTRUCTED FROM 1/4" X 3/4" HARD BALSA.
SET TAIL MOUNT AT 26°. 1/8" PLYWOOD.
F F-1 F-2 F-3 F-4 F-5 F-6 F-7 F-8 F-9 F-10 F-11 F-12 F-13
ALL STRINGERS 1/8" X 1/4".
NOTE: TAIL ASSEMBLY MUST BE KEYED RIDGIDLY IN POSITION.
1/2" X 5/8" MOTOR MOUNT
GEAR FAIRING 1/8" PLYWOOD. WRAP WITH CLOTH
FUSELAGE TOP
CONDENSER
COIL
TIMER
POINTS
PACK SET
GROUND
IGNITION
ALUMINUM TRIM TABS MAY BE ADDED FOR ADJUSTING.
PYLON LAMINATED 1/8" SHEET.
FOR INSTALLATION OF "SUPER CYCE" ONLY FRONT HALF OF COWL IS REMOVABLE.
W-1
BAT. BOX
WING DOWEL
NOTE: JOIN STABILIZER SECTIONS AT 26° FROM THE HORIZONTAL.
BOLT MOUNTS TO THE CRUTCH.
GRILL MADE FROM 1/20" BASS SHEET
COWL FORMED FROM BLOCK BALSA.
1/8" PLANKING
WING PLATFORM 1/4" SHEET
SUB RUDDER 1/4" SHEET BALSA.
FUSELAGE SIDE
1/8" DIA. LANDING GEAR WIRE
BOLT GEAR TO FIREWALL AND F-1.
1/8" SHEET PLANKING.
CRUTCH 1/4"X3/4"
ALL STRINGERS 1/8" X 1/4"
CROSS SECTIONS
ALL FORMER F-1 TO F-13, 1/8" SHEET BALSA.
1/8" X 1/4"
1" DIA. TAIL WHEEL
3" DIA. AIRWHEELS RETAIN WITH WASHERS SOLDERED IN PLACE. CHECK ALIGNMENT.
SCALE
0" 1" 2" 4" 6" 8" 10" 12"
.5"



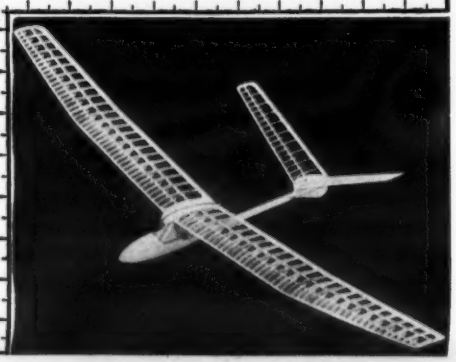


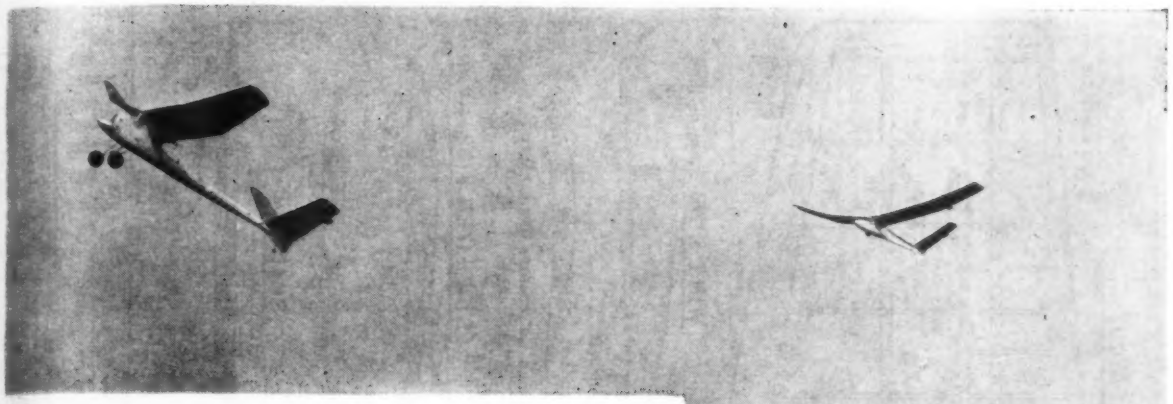
FLYING — FOR TOWING OPERATIONS, LET GAS MODEL TAKE OFF, HAND LAUNCH TOWLINE.

"PROP SPINNERS" N.Y. N.Y.

| | |
|---|---|
| CLASS D ENGINE | flea fright |
| SPAN 78 INCHES | |
| AREA 763 SQ.° | DESIGNED AND DRAWN BY: DON MCGOVERN |
| WEIGHT 60 OZ. | |

"PROP SPINNERS" N.Y. N.Y.





# Flea Fright

**by DON McGOVERN**

## Try this Glider-Towplane combination

THE two free flights, *Flea* and *Fright*, a couple of flawless freaks, stand as a horrible example of the victory of imagination over common sense.

A model builder is apt to do almost anything if he's crazy enough and so, meeting these qualifications, I started work on the models accompanying this article. It had long been my dream to tow a glider into the air with a gas job. This probably stems from the fact that I'm lazy, and therefore hate to tow it myself.

Investigating the possibilities more seriously, I slowly evolved a design that would be ideally suited for the towing operation, and yet a design which could hold its own on the contest field. First, I decided to use the same basic design for both ships—to duplicate as many common flight tendencies as possible, proportions varying to produce the most efficient model in each category.

As for size, I was in favor of large ships—72" for the glider, 78" for the gas model, as the towing operation requires slow and very steady flight, characteristics not usually found in smaller models. Landing gears were also used in order to facilitate assisted and unassisted R.O.G. flights. As stability in both designs was of utmost importance, high aspect ratio wings and underslung booms to keep the C.G. low were used. Last but not least came the butterfly tail, which was chosen for its performance on previous models and, equally important, to permit towing the glider from a point close to the C.G., instead of from rear of the fuselage as was often tried in the past with resulting wreckage. A normal rudder would be out of the question as it would interfere with the towline.

To eliminate the greatest threat to both ships—that of a careening out of control glider dragging the gas job to self destruction—an automatic cutoff is used in the towline, which permits towed flights of 5 seconds or so, until confidence and adjustment permit long flights with safety.

If you have been bitten by the urge to build either or both of these ships, there is no time like the present to begin. While this project is designed for the more advanced builder there is nothing difficult in the construction, and with a reasonable amount of effort you will have a fine flying job. Necessary sections of the plans can be enlarged with the graph system, a pair of dividers, and the scale on each plate.

Since both wing and tail assemblies are so much alike, the text will refer to both. After scaling up the plans, lay out the wing and stabilizer sections. In place of the tapered ribs, insert rectangular blocks of sheet balsa to be cut into ribs at a later time. This is easily accomplished by using a straight edge between rib W-3 and the tip rib, and shaving away and sanding until the proper airfoil is obtained. Once this is accomplished the rest of the job is clear sailing. Cut out the plywood gussets and join the wing and stabilizer sections at their proper angle; and don't spare the glue. For the gas model, 26° is used in the butterfly tail; in the towliner 30°.

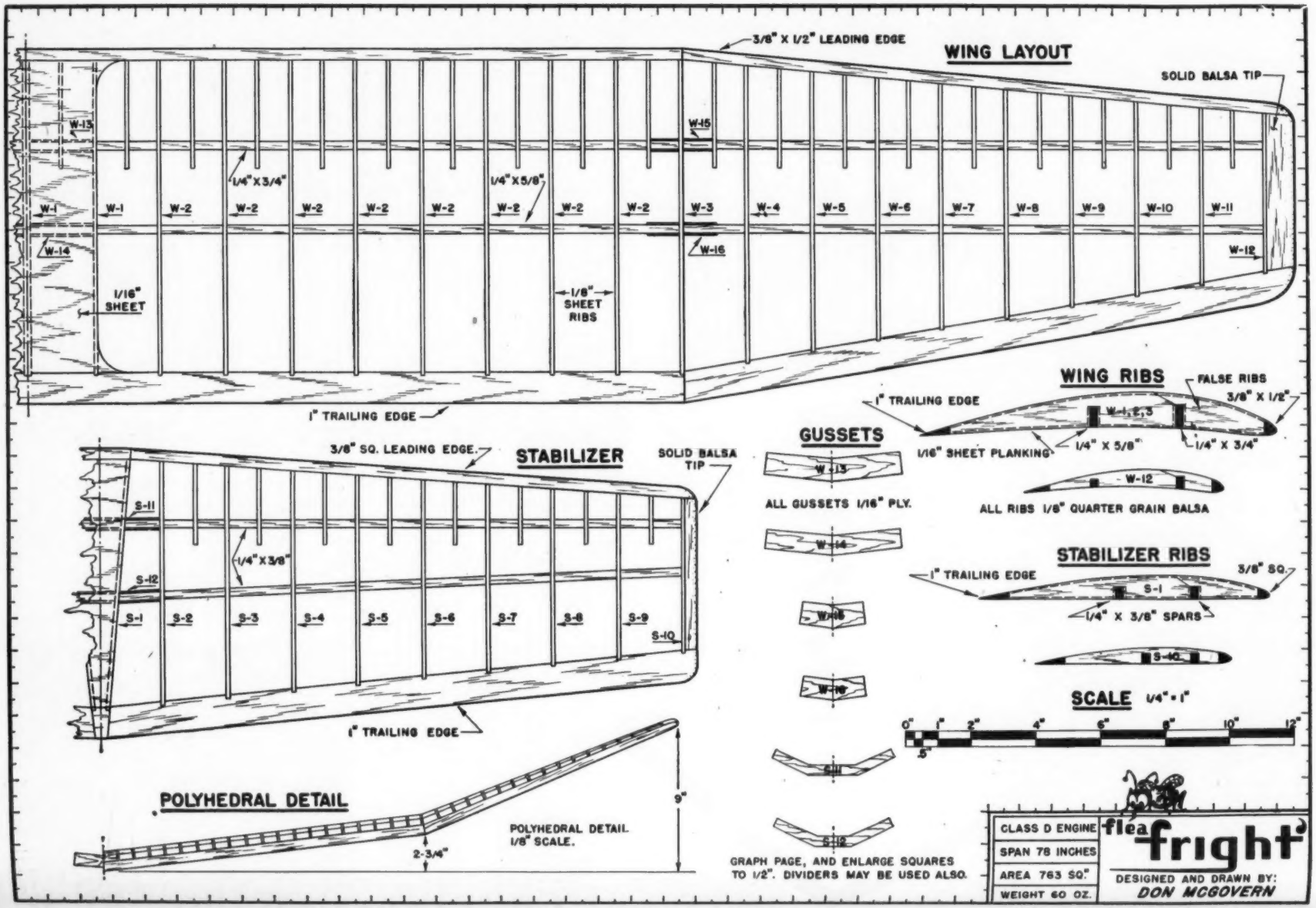
The fuselage for the *Flea* is next. First layout the boom which is constructed of 1/4" squares, covered with 1/16" sheet balsa. Before sheeting the boom, install a piece of .049" wire for a pop-up dethermalizer; this is definitely advisable. Under the new rules, the extra weight of the necessary mechanism for a dethermalizer and an automatic cutoff will only take the place of ballast, so do not feel that you will be handicapping your plane. Actually, it is the best insurance against those out-of-sight flights.

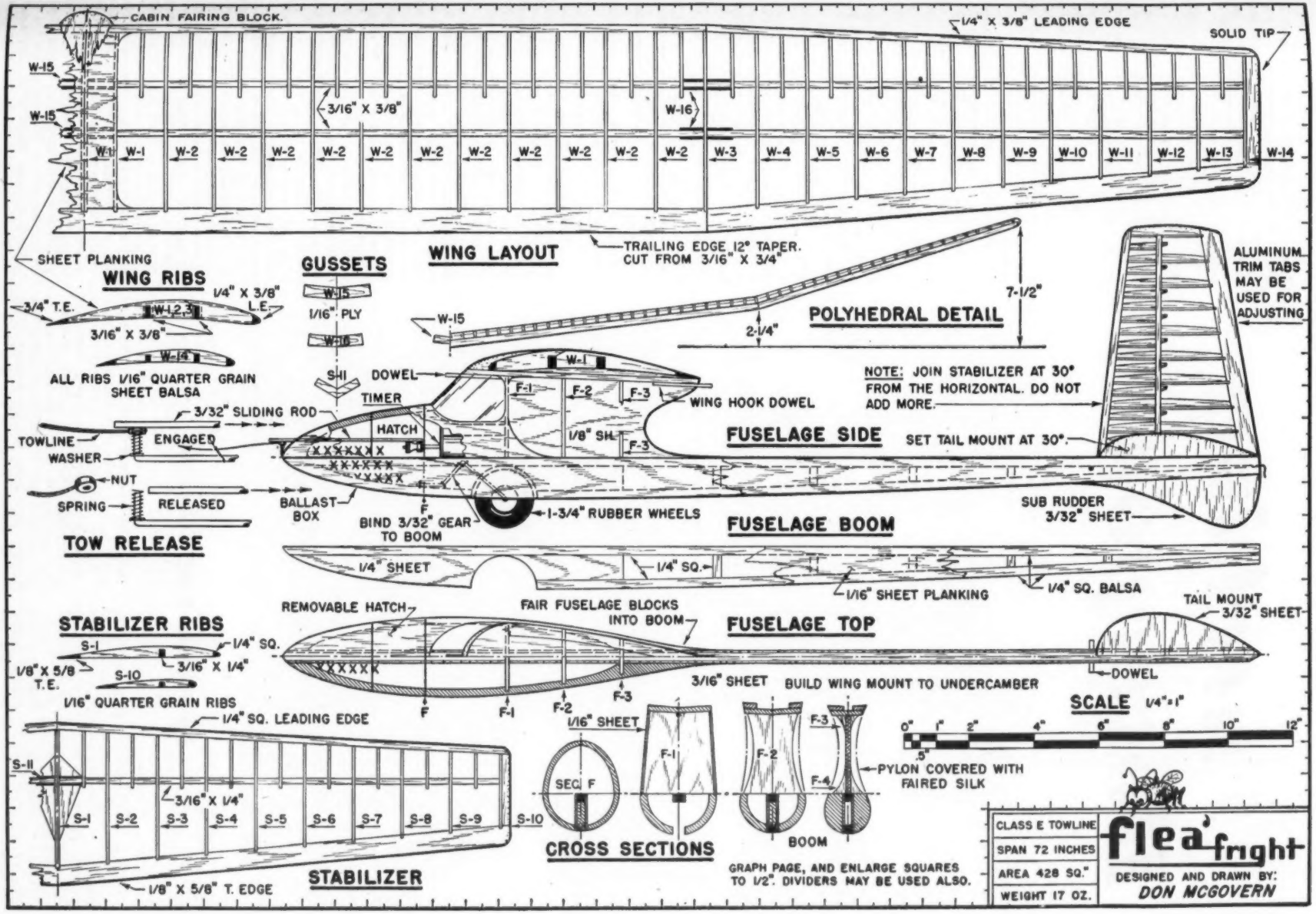
A belly wheel may be installed at this point, as shown on the plans, and though it is not absolutely necessary it does protect the fuselage from bruises and adds to the realism. It may be attached to the boom either by binding with thread or with a sheet metal bracket.

Select medium hard blocks if possible for constructing the pod—soft balsa will not resist the eventual wear to be expected from a few hundred landings on rough terrain. If a jig or coping saw is available, cut the block balsa to conform to the top view, allowing 3/8" for width of the boom. Cement the lower blocks in place, making sure the belly wheel has free travel. The blocks may be hollowed out as much as desired as soon as they are dry. The forward section of the pod will be filled with clay to bring the model up to its exact weight and proper balance.

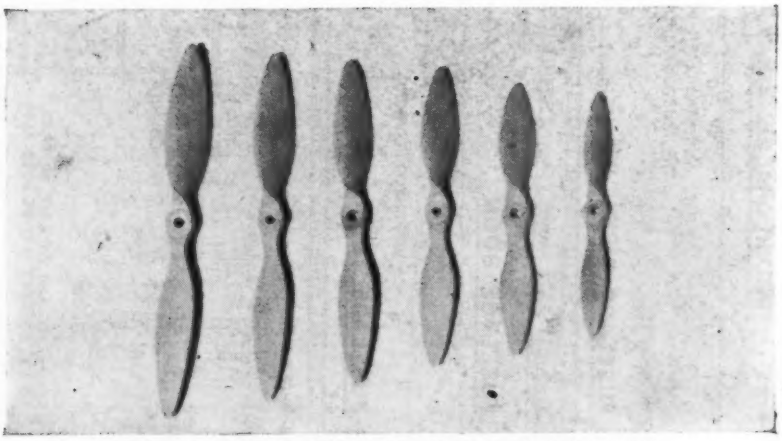
The pylon keel, sub-rudder, and butterfly tail mount should be cut from medium hard 1/8" sheet balsa. Make sure the grain runs the short way on the tail mount and sub-rudder to prevent

(*Turn to page* 56)

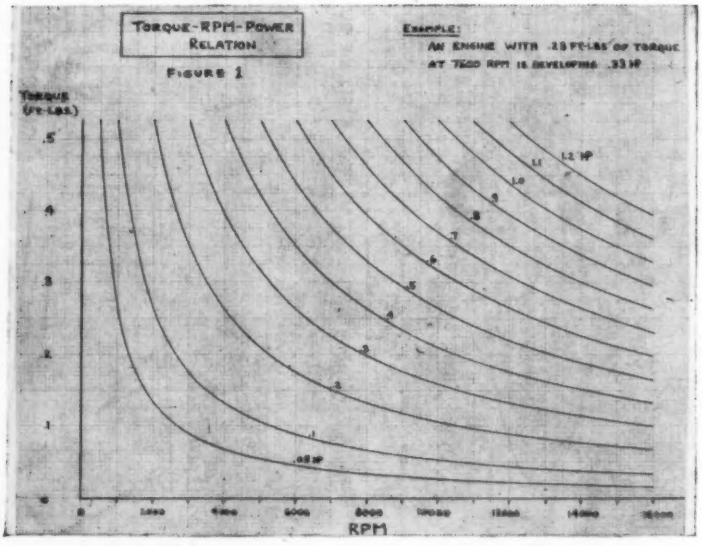

WING LAYOUT
3/8" X 1/2" LEADING EDGE
SOLID BALSA TIP
W-13
W-15
1/4"X3/4"
1/4"X5/8"
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
W-10
W-11
W-12
W-14
W-16
1/16" SHEET
1/8" SHEET RIBS
1" TRAILING EDGE
WING RIBS
FALSE RIBS
3/8" X 1/2"
W-1,2,3
1/4" X 5/8"
1/4" X 3/4"
1/16" SHEET PLANKING
GUSSETS
W-13
ALL GUSSETS 1/16" PLY.
W-14
W-15
W-16
S-11
S-12
ALL RIBS 1/8" QUARTER GRAIN BALSA
STABILIZER RIBS
3/8" SQ.
S-1
1/4" X 3/8" SPARS
S-10
STABILIZER
3/8" SQ. LEADING EDGE.
SOLID BALSA TIP
S-11
S-12
1/4"X3/8"
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
1" TRAILING EDGE
SCALE 1/4" = 1"
0"
1"
2"
4"
6"
8"
10"
12"
.5"
POLYHEDRAL DETAIL
9"
2-3/4"
POLYHEDRAL DETAIL. 1/8" SCALE.
GRAPH PAGE, AND ENLARGE SQUARES TO 1/2". DIVIDERS MAY BE USED ALSO.
CLASS D ENGINE
SPAN 78 INCHES
AREA 763 SQ."
WEIGHT 60 OZ.
flea fright
DESIGNED AND DRAWN BY:
DON MCGOVERN


CABIN FAIRING BLOCK.
1/4" X 3/8" LEADING EDGE
SOLID TIP
W-15
W-16
3/16" X 3/8"
W-1 W-2 W-3 W-4 W-5 W-6 W-7 W-8 W-9 W-10 W-11 W-12 W-13 W-14
WING LAYOUT
SHEET PLANKING
TRAILING EDGE 12° TAPER. CUT FROM 3/16" X 3/4"
WING RIBS
1/4" X 3/8"
3/4" T.E.
W-1,2,3
L.E.
3/16" X 3/8"
W-14
ALL RIBS 1/16" QUARTER GRAIN SHEET BALSA
GUSSETS
W-15
1/16" PLY
W-16
POLYHEDRAL DETAIL
7-1/2"
2-1/4"
ALUMINUM TRIM TABS MAY BE USED FOR ADJUSTING
S-11
DOWEL
TIMER
3/32" SLIDING ROD
TOWLINE
WASHER
ENGAGED
HATCH
F-1 F-2 F-3
WING HOOK DOWEL
1/8" SH.
NOTE: JOIN STABILIZER AT 30° FROM THE HORIZONTAL. DO NOT ADD MORE.
FUSELAGE SIDE
SET TAIL MOUNT AT 30°.
NUT
SPRING
RELEASED
BALLAST BOX
BIND 3/32" GEAR TO BOOM
1-3/4" RUBBER WHEELS
SUB RUDDER 3/32" SHEET
TOW RELEASE
FUSELAGE BOOM
1/4" SHEET
1/4" SQ.
1/16" SHEET PLANKING
1/4" SQ. BALSA
REMOVABLE HATCH
FAIR FUSELAGE BLOCKS INTO BOOM
FUSELAGE TOP
TAIL MOUNT 3/32" SHEET
DOWEL
STABILIZER RIBS
S-1
1/4" SQ.
1/8" X 5/8 T.E.
3/16" X 1/4"
S-10
1/16" QUARTER GRAIN RIBS
3/16" SHEET
BUILD WING MOUNT TO UNDERCAMBER
SCALE 1/4"=1"
0" 1" 2" 4" 6" 8" 10" 12"
.5"
1/4" SQ. LEADING EDGE
S-11
3/16" X 1/4"
S-1 S-2 S-3 S-4 S-5 S-6 S-7 S-8 S-9 S-10
1/8" X 5/8" T. EDGE
STABILIZER
1/16" SHEET
SEC. F
F-1
F-2
F-3
F-4
CROSS SECTIONS
BOOM
PYLON COVERED WITH FAIRED SILK
GRAPH PAGE, AND ENLARGE SQUARES TO 1/2". DIVIDERS MAY BE USED ALSO.
CLASS E TOWLINE
SPAN 72 INCHES
AREA 428 SQ."
WEIGHT 17 OZ.
flea'fright
DESIGNED AND DRAWN BY:
DON MCGOVERN

# Checking Horsepower



Calibrated props make possible quick engine power checks in the field




**by FRED YOUNGREN**

THIS is a continuation of the previous article describing the torque stand method for checking horsepower of model engines (see M.A.N. April 1948). It presents a simpler testing procedure made possible through use of a group of calibrated propellers. In the previous article the set of curves used to find the output horsepower when torque and RPM are known was printed with the RPM scale omitted; this curve is reprinted in Fig. 1.

Before we proceed, here are a few words on the background and theoretical justification behind this method. Perhaps the best place to start is to define some of the terms used. *Work* is defined as the product of a force and the accompanying displacement. *Power* is the time rate of doing work; one horsepower is equal to 33,000 ft. lbs. per minute—that is, if a machine does 33,000 ft. lbs. of work in one minute it is working at a rate of 1 hp. Another term used is *torque*, defined as a force times its lever arm.

We are interested in the relation between these two terms torque and horsepower. Consider a prop being turned by a shaft; its resistance to being turned can be represented by a distributed air force on each blade which opposes the rotation. These distributed forces can be replaced by two equal and opposite concentrated forces, one on each blade, resisting the rotation. Now let the symbol F represent each of these forces measured in lbs., and D the distance in feet between them. A pair of forces such as this is called a couple.

The distance each force travels in one revolution is the circumference of the circle it describes or $\pi$ D feet. In one minute each force F travels a distance of $\pi$ DN feet where N is the RPM. The work the two forces do together in one minute is twice the product of one of the forces times the distance it travels in one minute or $2F(\pi DN)$. To express this in terms of horsepower, we divide by 33,000 ft. lbs. per minute which as stated above is the rate of doing work equal to one horsepower. Thus $HP = \frac{2\pi FDN.}{33{,}00}$ Since the shaft is half way (D/2) between the two forces, the torque about the shaft due to one of the two forces is FD/2. Thus the torque (symbol T) due to both together is $T = 2FD/2$ or $T = FD$. Substituting $T = FD$ in the HP equation we get $HP = \frac{2\pi TN.}{33{,}000}$ By also substituting in the value of $2\pi = 6.28$ (since $\pi = 3.14$) and dividing we obtain $HP = \frac{TN.}{5{,}250}$ This formula represents the relation between torque, RPM and horsepower, and was used to plot Fig. 1.

Correspondence concerning the previous article brought up a question about location of the thrust line. It was suggested that perhaps an error was introduced because the thrust line is located below the axis of rotation of the swinging arm, which could be remedied by raising the motor mount until the two were in line. However, this is unnecessary, since the numerical value of a torque due to a couple (which is the condition we have here, see previous paragraph) does not depend upon the location of the axis about which it is measured. By making a series of calculations using a number of different axes it can easily be found that the magnitude of the torque in such a system is independent of the axis about which it is measured. It may also be verified experimentally.

In case you would like to use a torque stand to measure the horsepower of very small engines (1/10 HP and under) such as the CO2 or gasoline engines of small size, a few simple changes make this possible. Build a stand like the one originally shown but keep the swinging arm as light as possible. Now change the numbers of the torque scale on the back of the stand to read from 0 to .05 ft. lbs. To correctly calibrate this scale it will be necessary to use a weight of .05 lbs. instead of .5 lb. when calibrating the stand. The horizontal distance from pivot to weight string remains one foot. This completes the changes required on the stand. The graph of power, RPM and torque (Fig. 1 in this issue) can be used to find the results from your tests if you also change the torque scale on the graph to read from

0 to .05 ft. lbs. in place of 0 to .5 ft. lbs., and the horsepowers to read from .005 to .12 HP. The RPM scale is not affected and the rest of the testing procedure is the same as given before.

The first runs made on my torque stand were done as described in the first article, and that may be considered the basic test procedure. However, after repeating the process of unbolting engines from their planes to mount on the torque stand several times I decided to try to eliminate this tedious operation. Knowing that the horsepower absorbed by a prop is a function of the RPM, I proceeded to calibrate a series of props so that by measuring the RPM at which one of these props is turning I could determine the output horsepower of the engine from these prop calibration curves. This idea worked well and is described below. (I'd like to thank Ray Acord of *Air-O* for his donation of the props which I used, and the *Hawthorne Modeleers* for their assistance with the tests.)

First secure a family of props such as shown in the photo at the beginning of the article. I suggest that you dope them some distinctive color to set them apart from the rest of your props. Set up your engine on the stand, mount one of these props and go through the procedure for calibrating the stand to make sure the scale readings will be accurate. Now take a series of simultaneous readings of torque and RPM at a number of speeds with this prop. (Note that it is not necessary to run the engine at top speed as when we were checking the power of the engine, for this time we are interested in the power absorption characteristics of the prop, not the power output of the engine). From Fig. 1 find the horsepower which corresponds to each RPM. By proceeding with a similar series of runs for the other props it is possible to obtain a graph such as Fig. 2. If the props differ in weight it may be necessary to recheck the calibration of the torque stand after changing props.

An easy way to check the accuracy of your data is to plot your results of horsepower versus RPM for each prop on logarithmic 2x2 cycle graph paper. This may be purchased from any technical supply store or you can plot your curves on Fig. 3 which represents my results. This plotting procedure is helpful, for on this type of graph paper the "curves" turn out to be straight lines. This eliminates the need for a great number of runs. Because the horsepower absorbed by a prop varies as the cube of the RPM, the lines have a slope of 3 to 1. If you are careful in taking your readings, one point will be sufficient to completely define the power absorption curve for each prop on a graph of this type. To do this, plot that point and draw a straight line of 3 to 1 slope through it (see Fig. 3). Now, by making another run at some other RPM, the accuracy of this initial reading may be confirmed because this second point should fall on the line previously drawn. When you are satisfied your values are correct, a graph such as Fig. 2 may be plotted by reading values from the lines on Fig. 3 and replotting them on regular graph paper.

It is possible to eliminate the steps involved in plotting Fig. 3 by plotting Fig. 2 directly, but to do this many more runs will be required and it will be difficult to obtain the close check on the accuracy of your results which is made possible by use of a graph similar to Fig. 3.

By now the method for using these calibrated props should be quite apparent. Simply fasten each in turn to the engine whose power versus RPM curve you wish to determine and run each at *top speed*. From your prop curves (similar to Fig. 2) you can find how much horsepower is required to turn each prop. These values of horsepower plotted versus their respective RPM's will give the power variation curve for that engine. Notice that all tests should be made in still air, preferably indoors (be sure of good ventilation, though) to eliminate the effect of the wind which could cause the RPM to vary and thus result in incorrect readings. I would also like to emphasize that my tests show there is enough difference between two seemingly identical props to cause them to have quite different power absorption curves. Because of this, only the specific props you have calibrated can be used with your curves, similar props will give false information if you attempt to use your curves with them.

If you have any further questions I'll be glad to answer them. Just write to me in care of this magazine. Remember that although you are *calibrating* the props you have not found out anything about their *efficiency*, for that depends in part on the thrust produced which is something we have not measured.

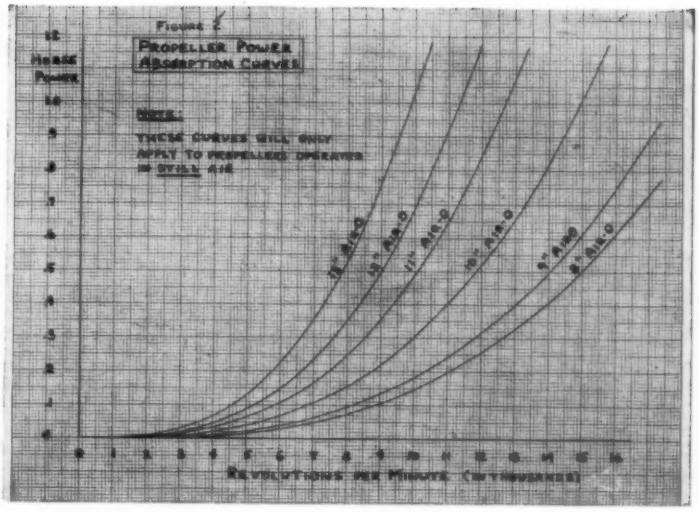
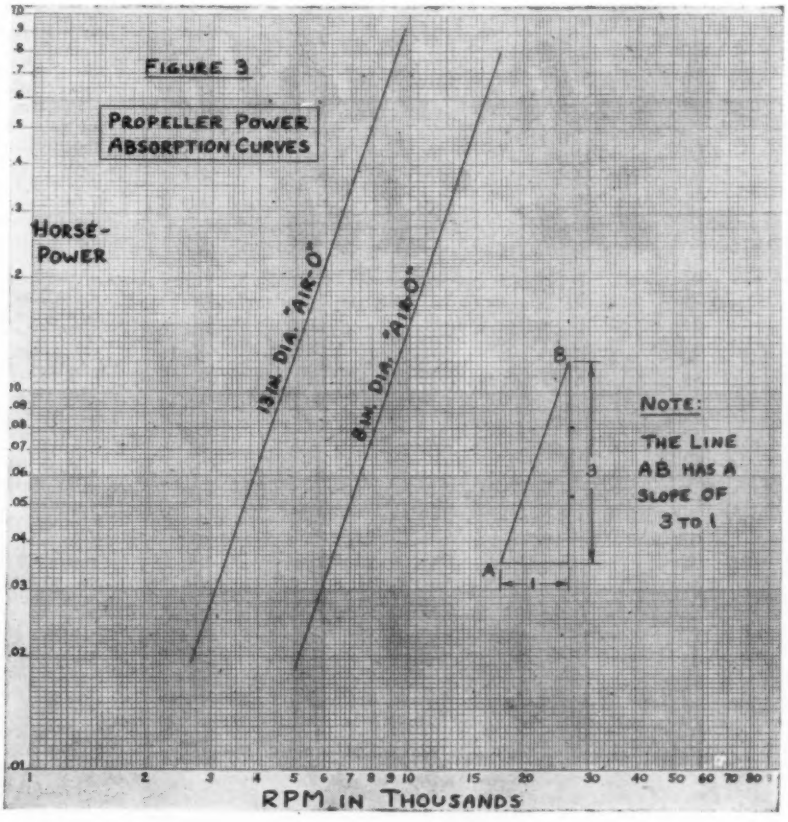


Figure 2
Propeller Power Absorption Curves
Note:
These curves will only apply to propellers operated in still air
Horse Power
Revolutions per Minute (Hundreds)



1935 winner built by Gordon Light, with the famous Wakefield Trophy

# Wakefield in '48

**An internationally famous event is being flown again in 1948**

***by JOHN L. MACKENZIE***

NINE years have elapsed since the war suspended competition for the Lord Wakefield International Trophy. During this time a new generation of model builders has entered the game, a generation to whom the Wakefield may seem more of a myth than a reality. But the "old mug" is far from mythical, for 1948 is returning it to circulation! What is more, the contest will be held right here in our own U.S.A. by virtue of Dick Korda's victory at the last meet, held in '39.

It will be in the shadow of the great Goodyear-Zeppelin air dock at the Akron, Ohio Municipal Airport that the world's finest model builders, in person or by proxy, will pit their skill against each other in a renewal of modeldom's premier competition. Talk of this event has been stirring model circles for almost a year. Now the time is almost at hand—it will be on August 27 that the contest will be run; the previous day has been set aside for test flying and adjusting models.

But the first crucial test for the aspiring contestant comes at the Nationals, where our top 5 men will be selected by elimination to supplement our defending champion on the United States team. The Wakefield Committee of the A.M.A. will also select, from among our best fliers, proxies to handle the models of foreign contestants unable to attend.

For the benefit of those unfamiliar with the details, let us state that Wakefield models must meet exacting specifications. They are limited to 200 sq. in. wing area with a tolerance of plus or minus 10 sq. in. Power must be rubber and it must be totally enclosed within a fuselage or fuselages. Maximum crossection area of the fuselage must be not less than L 2/100 where L is overall length of the fuselage including booms, etc., but excluding the propeller. Minimum allowable weight of the complete model is 8 oz. Horizontal tail surfaces must not exceed 30% of wing area. Official time is based on the average of 3 flights.

To the team selected at Olathe goes the honor of representing our nation's modelers in an international rivalry. To the proxies will go the privilege of demonstrating the finest sportsmanship of America's model flying fraternity. And all will share in the unique experience of the Wakefield fellowship. For the Wakefield as a model airplane contest, is definitely in a class by itself. It might well be called a classic, the absolute tops in modeldom. And the fellow who captures the Cup has a perfect right to the title "International Champion."

It was back in 1928, when rubber powered stick models reigned supreme, that Sir Charles Wakefield of Hythe established this competition. His purpose was twofold: first, he desired to foster in the model field a friendly spirit of international competition which would bring the participants into close relationship. Secondly, he wanted to encourage the development of new ideas in model design, particularly to bring a closer resemblance to man-carrying craft than was seen in the models of that time.

Needless to say, both of Lord Wakefield's objectives were soon realized. The spirit of sportsmanship and comaraderie which has permeated this event since its beginning has been unsurpassed in any field of sport. Everyone who has ever had the privilege of participating in the contest counts the experience as one of the highlights of his model flying career. In the area of model progress and development, the Wakefield has had a more far reaching effect than any other competition. Probably few of the present school of modelers realize that this event not only was the origin of the enclosed fuselage type of model, but it *gave birth to the gas job as well.* Minimum wing loading restrictions also were first imposed on model planes by the Wakefield. In many respects this international contest led the way in developing the outdoor flying model from a flimsy fair-weather floater to the rugged ship it is today.

When the Wakefield was established its rules differed radically from present regulations. Generally speaking they were very broad, allowing almost unlimited scope for new ideas in model design. The one

Dick Korda, who won in 1939

Gordon Light built the model at top

Jim Cahill winds while Wisniewski and Just hold the *Clodhopper*

Copland of English team winding his model during 1939 meet

The USA team which brought the trophy back to us in 1938

fundamental restriction established at that time and which has never changed but rather has spread to all model competition, was the fuselage crossectional area requirement. This was the L 2/100 formula which is now part of every modeler's knowledge. Minimum wing area was set at 125 sq. in., with a required minimum weight of 1 oz. for each 50 sq. in. Any type of power was allowed and there was no maximum limit to size of the model, other than that it could weigh not more than 11 lbs. Responsibility for conducting the contest and adjusting its rules from year to year was assigned to the Society of Model Aeronautical Engineers of England. The first event was to be held in England, and each succeeding contest in the country holding possession of the trophy at that time. Competition was open to any modeler who could attend or who could furnish a model to be flown by a proxy flier appointed by the host club.

At our own 1929 Nationals, top prizes in the indoor and outdoor events were trips to Europe. Joe Culver of Oakland, Calif., and Donald Burnham of W. Lafayette, Ind., champions in these respective classes, thus were the first American contestants to try for the Wakefield Cup. Using planes of the best current American designs, they failed to place in that first running of an international contest. But they did learn a valuable lesson: that English weather is quite different from ours, and that current American ships were too light and flimsy to stand the gaff of flying conditions encountered there. Consequently, on their trip home they were already laying plans for more rugged designs which might easily do better than the 70 sec. flight that had won the Trophy for T. Newell of England.

The succeeding year saw our boys focusing their attention on fuselage models. A new event for outdoor fuselage jobs was added to the Nationals in response to this interest. So when our 1930 champions took their prize trips to Europe they were primed to the teeth for that Wakefield fracas. It was 18 year old Joe Ehrhardt of St. Louis, our top man in both outdoor stick and fuselage, who grabbed the Cup by a margin of 58 sec. over his closest competitor. His flight of 178 sec. established a new English record for that type of model. Canadian and German, as well as English contestants, were on hand to see the Lord Wakefield International Trophy start its first trip to the U.S.

There can never be any doubt that Ehrhardt was the real champion of his day, for he became the first and so far the only man to win the trophy twice when he scored again in 1931. This first running of the Wakefield on American soil occurred at Dayton, Ohio as part of our National Model Airplane Meet. Several Canadian entries were present but England had to send her models to be flown by proxy. Joe's winning time was 4 min. 24.8 sec.

The great depression disrupted the next Wakefield event. The contest was again scheduled for Dayton in June 1932, but the Airplane Model League of America (which at that time conducted the Nationals) lost its financial backing. The Nationals might have folded up then and there but for the heroic work of the Bamberger Aero Club of N.Y., an A.M.L.A. chapter, which plunged in with the summer half gone and reorganized our National Meet, holding it at Atlantic City in September. They included the Wakefield event but did so without authority of the S.M.A.E. Because of our failure to hold the contest at the originally scheduled date the English governing body declared the September event "no contest" and returned the cup to England. Their action, of course, was justifiable because the changing of dates without sufficient advance notice was unfair to prospective foreign competitors.

However, the competition at Atlantic City deserves mention for the importance it played in model aircraft history. It was not Gordon Light's winning flight of 7 min. 57 sec. for which we claim recognition, spectacular though that was for its day. Rather, it was Maxwell Bassett from Philadelphia, the 4th place contestant, who introduced a new era of model flying at that time. He sent into competition the first successful gasoline powered model airplane for a flight of 2' - 55". His appearance on the field with this new type of ship, and the engine which his friend William Brown had developed, took the aeromodeling world completely by surprise and stole the show from all other contestants.

America's having lost the Trophy by default meant, of course, that the 1933 contest was to be held in England. A new rule was made about this time limiting each nation to 6 entries. However, the regulation had no bearing on our participation that year because interest in the event had dropped to its lowest ebb. Gordon Light, of Lebanon, Pa. was the only one of our boys to send a model over. He rated 3d place, with England retaining the Trophy on the strength of J. W. Kenworthy's 5' - 21" flight.

The following year the S.M.A.E. injected new life into the Wakefield by drawing up a completely new set of rules. In view of the growing domination of gas jobs, they decided to limit the event to rubber power only. A restriction of 200 sq. in. plus or minus 10 sq. in. was placed on allowable wing area. Minimum model weight was to be 4 oz. Official timing was to be based on the average of 3 flights instead of on the longest of three, as previously. This, of course, was to reward consistent performance rather than chance out of-sight flights. Here again a rule was born that has come down to our day.

It was decided by the N.A.A. that our team of 6 modelers for the 1934 meet would be picked on the basis of best past performances. Thus it was that we sent over 6 models, all to be flown by proxy. Gordon Light, our perennial entry, was in there again trying to redeem himself by getting a legitimate hold on the trophy which he had won unofficially in '32.

The Wakefield contest of that year will be remembered for the bad weather in which it was flown. An all-day drizzle failed to cause a postponement; consequently flight times were low. J. B. Allmen of England registered an average of 1 min. 52 sec. to win. The best American time was Frank Zaic's 1' - 25", earning third place. It is interesting to note that Frank's model, which had a planked balsa fuselage, had soaked up enough water to increase its weight 3 oz. But the English took this soup right in their stride to come out on top. This '34 event saw France's entry for the first time with 3 contestants.

Big news came to American modelers in 1935 when a cablegram brought word that Gordon Light had come through. For the first time in Wakefield history a proxy-flown model took the trophy, rewarding Light for his persistence and determination. Our 1935 team had been chosen in the same manner as the previous year and again all models had been shipped over without their builders. But this time England produced some real American flying weather, and out-of-sight flights were

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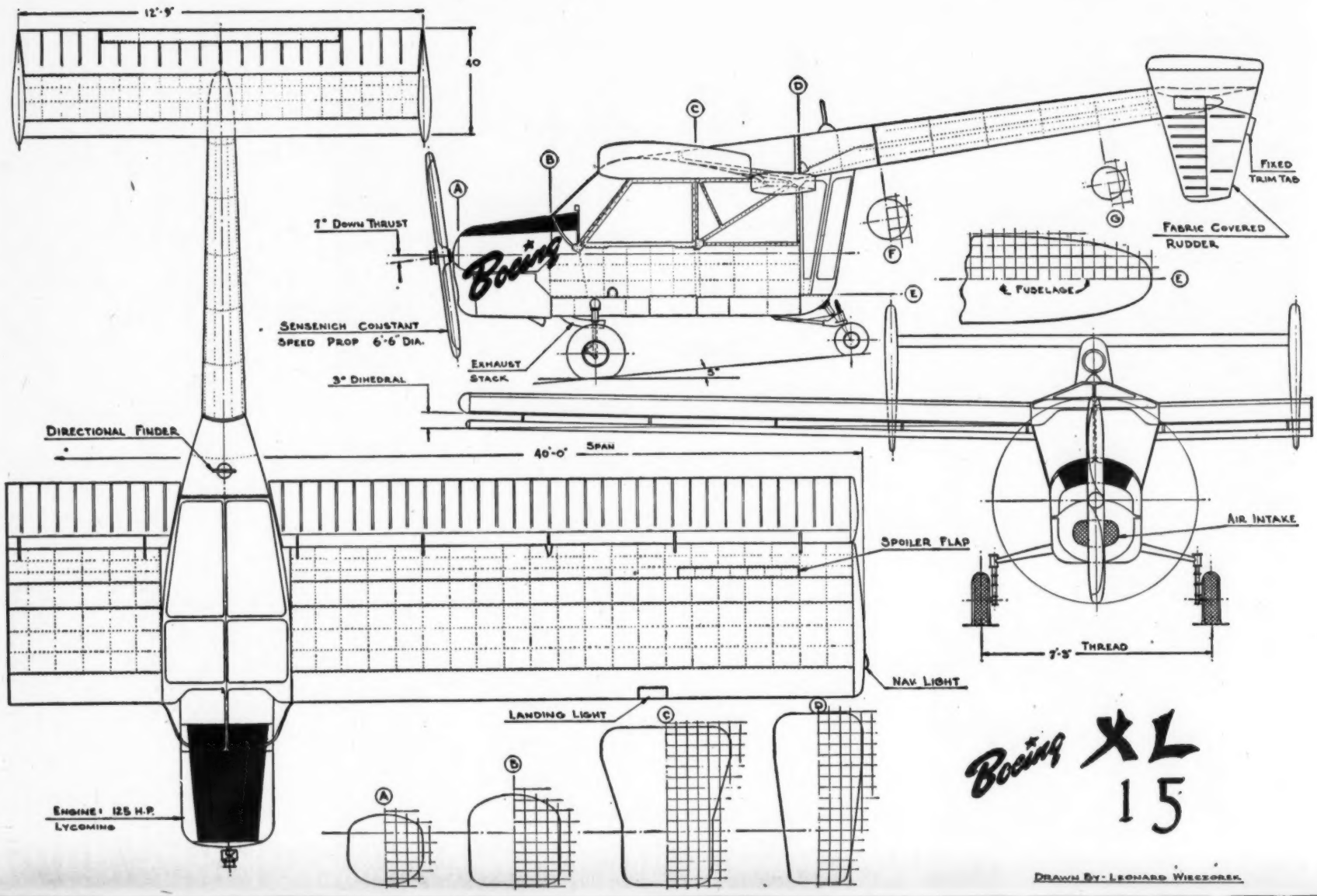


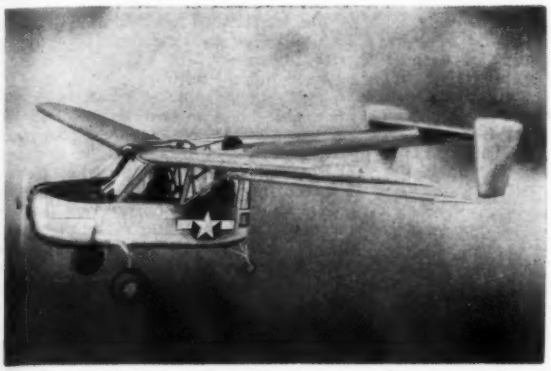

# Boeing XL 15

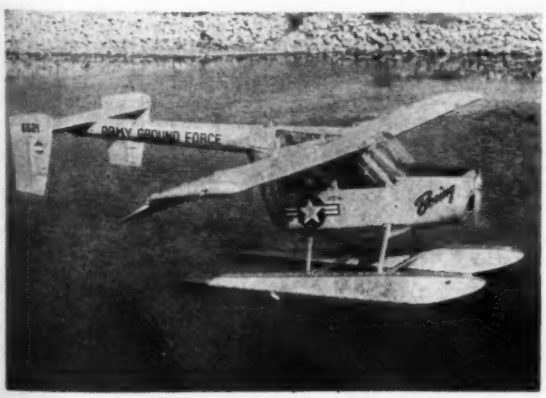
Drawn By: Leonard Wieczorek

# Boeing XL-15

**THIS VERSATILE SCOUT CAN EVEN FLY FROM THE WATER**

*by* **ROBERT McLARREN**






THEY'LL never forget the "grasshopper" of World War II! Thousands of Pipers, Aeroncas, Stinsons and a half-dozen other lightplane types swarmed into action and slewed across the front lines, bobbed up and down in forward areas and transported a thousand-and-one items from the supply depots: all at 80-90 mph!

Think of going to war at that speed; yet, according to a famous story, a "grasshopper" actually "brought down" a Messerschmitt Me-109 fighter, the terror of the German skies the first three years of the war! (No, it wasn't in a dogfight; just a case of the Me-109 diving on a low-flying "grasshopper" and forgetting to pull out!)

No need to relate the heroic and often vital jobs performed by the "grasshopper" in World War II; that has already filled at least one book and will fill many more. But it wasn't just the "L" pilots, the wounded and the supply men who won't forget these fragile craft: the high command can't forget it either! When the utility of the grasshopper became evident to the Air and Ground Forces during the war, regular commercial models only slightly modified were purchased "off the shelf" for several reasons: they were in quantity production, they were available at an economical price, and there were many pilots who could fly them although not rated for combat aircraft. But as the war progressed the need for an especially designed liaison plane became evident.

Air and Ground Forces found little fault with the military adaptions of the commercial lightplanes. What they wanted was merely more of the same: lower landing speed, shorter takeoff run, *slower* cruising speed, more visibility, increased stability, a little more strength, and greater adaptability to "knock down" for transportation and storage. The military let these requirements "pass" in favor of getting on with the war, but shortly after V-J Day when there was more time to think about the problem Air Force took up the problem of the liaison airplane with thorough study of the special needs of the AGF.

What the AAF-AGF wanted, stated simply, was an airplane that would "do everything"—and they meant that literally! For if you were to gather up all the speeches ever delivered on the subject "What's Wrong with the Lightplane," itemized each of the requirements and tossed it to Boeing Airplane Co. engineers, you'd have a surprisingly accurate idea of the design requirements of the XL-15 *Scout*, our Plane of the Month. Here's a rough idea:

Short takeoff: The *Scout* will start from a dead stop, accelerate, lift from the ground and clear a 50 ft. obstacle placed only 600 ft. from the starting point!

Slow hovering speed: The *Scout* will hover in the air for hours at a forward speed of less than 40 mph.

Low stalling speed: The *Scout* stalls with full flaps and full power at less than 13 (yes, that's *thirteen*) mph!

Add to these such features as: unlimited visibility in nearly all directions, ability to operate on wheels, skis, floats or no landing gear (yes, that's right, with the famed Brodie mid-air cable gear!), easy maintenance, quick disassembly, small overall dimensions of major assemblies, full instrument and radio equipment, provisions for photographic equipment, hot and cold weather resistance and easy-to-fly stability and control; wrap all these up and you have the Boeing XL-15 *Scout!*

What manner of airplane is this that answers *all* of the private pilot's dreams and yet accommodates the strict requirements of the military services. Well, to be sure, it's no conventional design. It is built around a central "pod" in which the engine, pilot and observer are placed in front-to-rear

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# Radio Control Kinks

**Hints to help your radio control work**

*by E. J. LORENZ*

THERE have been numerous inquiries as to various hints and kinks concerning the latest phase of model building, radio control. We'll try to iron out a few of those kinks for you and supply some hints, too, so that you can get on with your warm weather building.

The first item in Fig. 1, is for a strictly portable antenna for radio control transmitters. This antenna will fit any transmitter operating between 50 and 54 megacycles, which covers just about all the commercial units on the market today. The materials needed are: one banana plug; a 4-1/2" length of polystyrene or lucite rod (fibre or hard rubber could also be used) 1/4" in diameter; one 18" length of 1/4" thin walled brass tubing, and about 3 ft. of No. 18 bare or enameled copper wire. One end of the plastic rod is drilled so that the banana plug can be screwed into it. The other end has a shoulder cut or filed on it, 1/2" long, so that the brass tubing will fit over it. Solder one end of the length of wire to the banana plug, taking care that the heat is not applied too long or it will melt the plastic rod. Next, wind 25 turns of the No. 18 wire around the rod, spacing the turns about 1/8" apart. This should cover the length of rod up to the metal rod. Make several turns around the brass tubing and solder.

The theory of this antenna is that of a 1/4 wave vertical radiator. Alterations should be made on the transmitter to make the antenna circuit suitable for this antenna. Instead of two leads going into the transmitter, as is the case with 300-ohm antenna feeders, one end of the antenna pick-up coil is grounded to the case and the antenna is connected to the other end. This antenna will give good results over water for distances of from 600 to 800 feet, over ground for more than 1200 feet, and in the air for about 1/2 mile, which is more than is usually needed for the control of a model.

Fig. 2 shows how two or more transmitters may be used on the same 300-ohm dipole antenna, such as is normally used with the Beacon and Aero-Trol transmitters. Attach the second or third lead at the junction as shown in the sketch. This will give good results with no interaction; however, only one transmitter can be used at one time.

Fig. 3 shows a lightweight meter jack for plane installations. One phono jack and two plugs are needed. The phono jack is fastened in the plane and connections properly made (the jack is inserted in series in the 45-volt "B" plus lead). One plug is shorted out, between the prong and the outer metal piece, by a piece of wire soldered in place. The other plug is connected to the meter with convenient lengths of wire (keep them as short as possible), making sure the polarity on the meter is correct. In use, the meter plug is inserted in the jack and the receiver adjusted. When the plug is removed and the shorted plug inserted, the circuit is closed and the receiver operates normally. This makes a very lightweight means of inserting the meter without removing wires to take a reading.

Fig. 4 gives the remedy for sticking relays. Sticking happens occasionally when the relay armature is pulled down directly onto the pole piece. By closing the magnetic circuit in this way, a slight residual magnetism is created. When the relay is set for very sensitive action, this residual magnetism is sometimes enough to prevent the armature from being pulled away from the pole by the spring. A thin piece of cellophane, such as from a cigarette package, about the width of the armature, is slipped between the armature and the pole piece. This prevents the two pieces from making direct contact and thereby assures proper operation of the relay.

Two new batteries that have come on the market recently are shown in Fig. 5. Cell A is a subminiature pencell type manufactured by the Brownie Mfg. Co. of New York City. These cells can be obtained from the company at a cost of 15c for two. The B cell is the new Sonotone hearing aid 1-1/2-volt "A" cell. The length is the same as a regular pencell, but instead of being round in form it is square. By adding the extra volume of the corners much longer life is obtained. Of these two new cells, the author has had a chance to test only the Brownie. The results were amazing for such a compact source of 1-1/2 volts. By using an RK-61 tube as the load, this cell went from a starting voltage of 1.56 volts (no load voltage was 1.7 volts) down to 1.12 volts in 1 hr. 10 min. This is much better than was obtained in other tests using the regular larger sized pencells.

A very compact and lightweight plug and jack unit for receiver or booster connections is shown in Fig. 6. The jack

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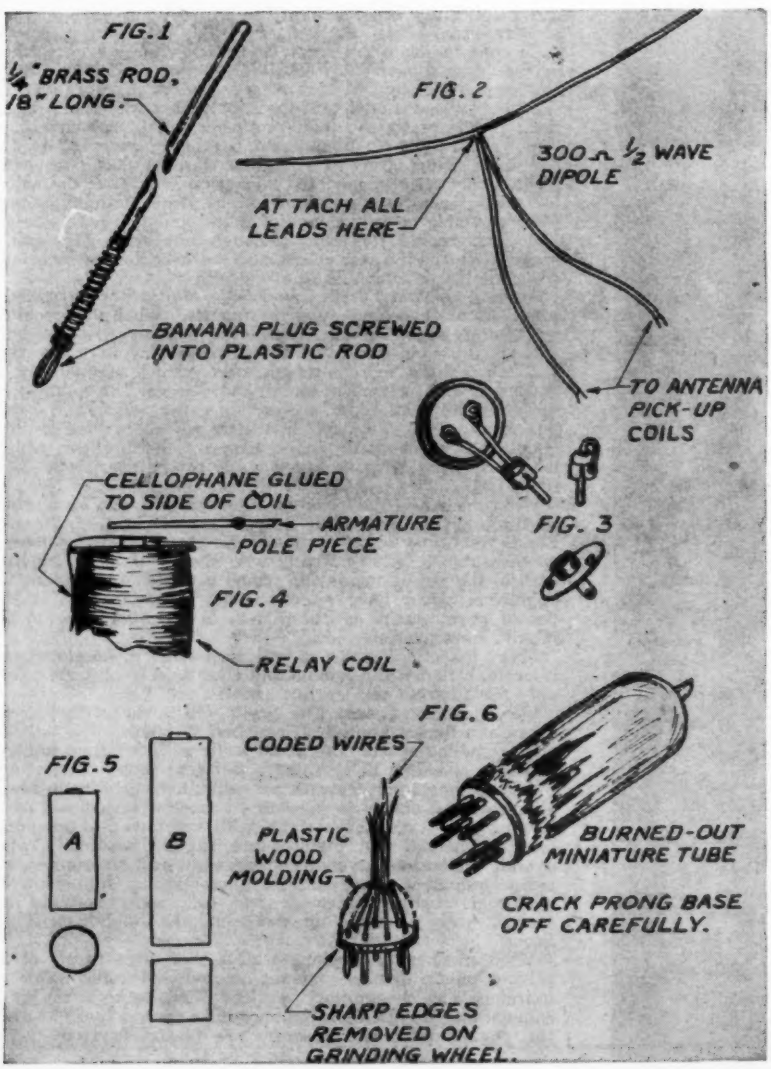


# Model DeHI

*by* **BERNE DANIELSEN**

WORLD WAR I model fans are still far from a rarity in the modeling game, and for this reason we present this little job that is a sure attention-getter anywhere. In addition, it's a consistently good flyer. So here it is—the old De Havilland I, which was, despite its looks, one of Britain's Royal Air Force mainstays during the first years of that war.

The ship was used primarily for reconnaissance, since this was before the period of intense air combat; but it was also used as a fighter and bomber. Airplanes were pretty much jack-of-all-trades at that time. This De H. was in its heyday up to the advent of the later Bristol Fighter.

Though the ship was similar in many respects to both the Vickers *Gun Bus* and the *Fee*, don't confuse these three airplanes, for they were entirely different ships. The De Havilland was usually powered by a Beardmore engine, and the armament consisted of a single machine gun in the forward cockpit. These ships were pretty rough on the crew when they piled up head-on, for in such cases the motor usually tried to crawl into the cockpit with the pilot.

Now let's get on with the construction of the model. Start by scaling up the plans to full size. Build the wings first. Both upper and lower wings are the same, except that the upper has a centersection while in the lower only the main spar goes through. The wings are made in orthodox fashion over the plans, with the ribs cut from 1/16" stock, as are the various curved parts. The main spar and leading edge are 1/8" square, the secondary spars are 1/16" square, and the trailing edges 1/16" by 1/4". Build each wing panel separately, and later glue together with the correct dihedral (3/4" at the tip). Cut the strut sockets from 1/16" sheet, drill a 1/16" hole in them, and glue into position as indicated on plan.

The rudder and elevator are built directly over the plan, and type of construction is self-indicative. All parts are cut from 1/16" sheet.

The tail booms or out-riggers are shown full length on the plans, so construct two of these directly over the plans, also, from 3/32" square stock. Glue them together at the tail post, and insert the top and bottom braces just forward of the horizontal tailplane. When doing this make sure the angle between them is correct.

Use 3/32" square stock to lay out the sides of the basic fuselage frame, and connect the two sides with the crosspieces. Make the little semi-box into which the bottom spar will fit, and glue it into position before cutting away those portions of the longerons. Carve the nose, top, and rear blocks from soft balsa, hollowing out as much as possible for lightness. The top part is best made from three pieces, building around the motor stick notch. The motor stick is simply a 1/4" square 13" long stick of pine, to which the bearing attachments are glued and wrapped with thread. Use 1/32" wire for the front hook, and a piece of 1/16" aluminum tubing glued to a piece of 1/8" sheet for the rear bearing.

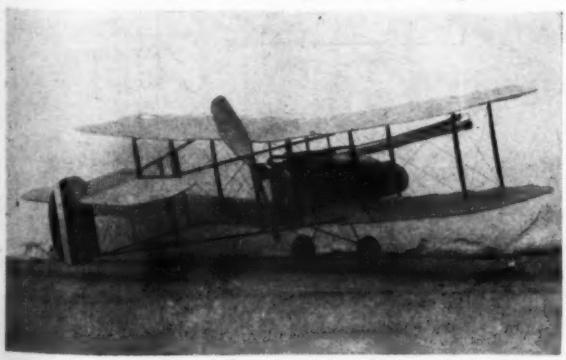
Bend the landing gear components from 3/64" wire and glue and wrap to the frame. The spreader bar can be made integral with the rear piece of the landing gear assembly, or separately. Cut out a circular piece of stiff paper, remove a small wedge segment from it, gluing the edges back together to form a shallow cone and glue these to ordinary wooden wheels for a realistic effect.

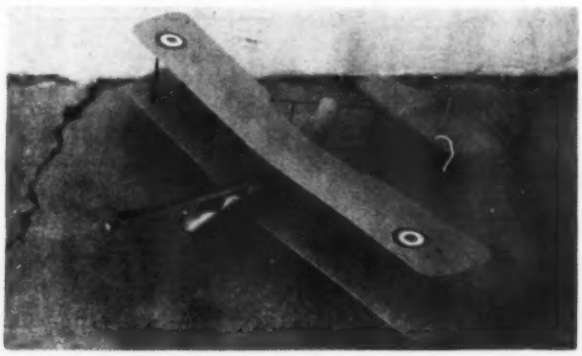
Cover all parts before assembly because you can do a much better looking job this way. To make the ship even more eye-catching, the original was colored as follows: yellow wings and tail surfaces, silver body, and red tail booms, struts, etc. Almost any color scheme is acceptable, though, so obey your own whims on this. When spraying the covered model, first with water, then with thin clear dope, take special care that no warping occurs, particularly in the tail surfaces.

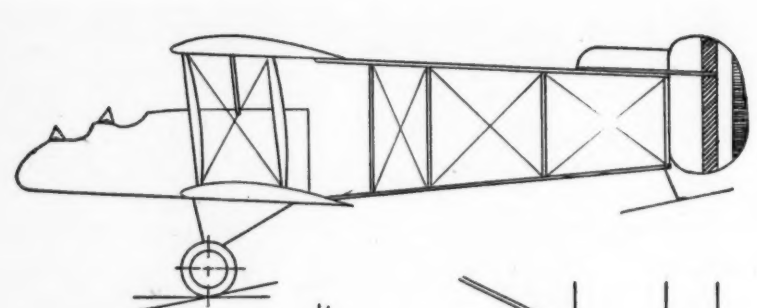
Begin assembly by gluing into position the lower wing, then mounting the struts, which are made by gluing to a 1/16" dowel a piece of 1/16" sheet, and sanding this assembly to streamlined shape. Then slip the upper wing on and glue the tail-boom assembly into position, adding elevator and rudder. Use plenty of glue on all these procedures, because it must be strong.

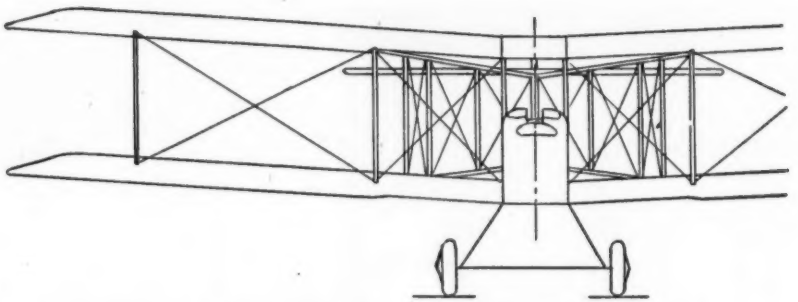
Add the details, such as flying wires, insignia, etc. The motor stick can be mounted in any way you wish, but remember that it has to be strongly attached. A good way is to use

(*Turn to page* 61)

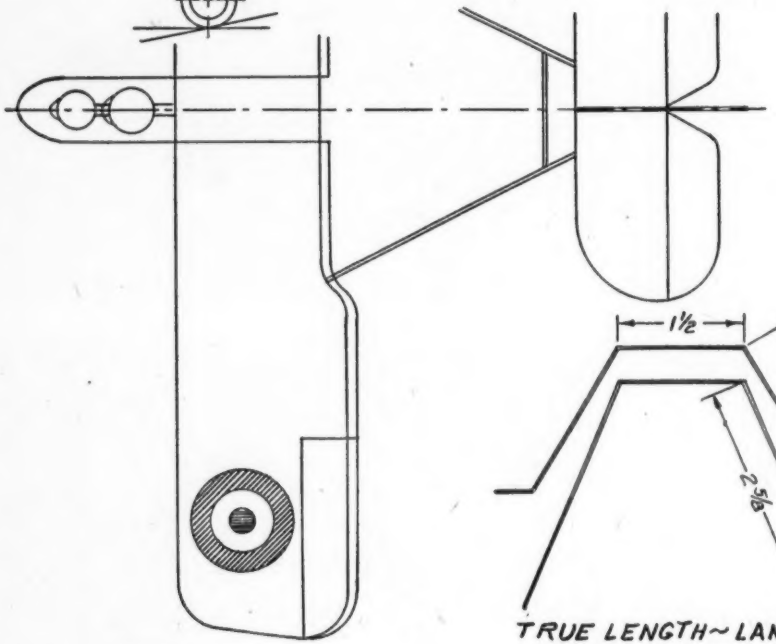


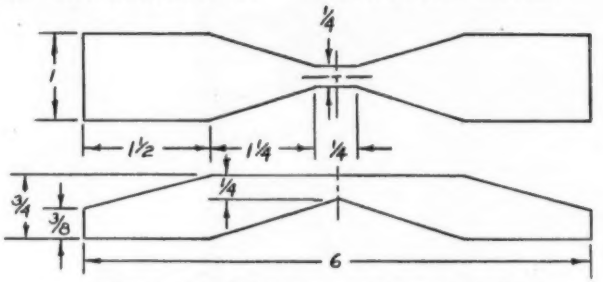




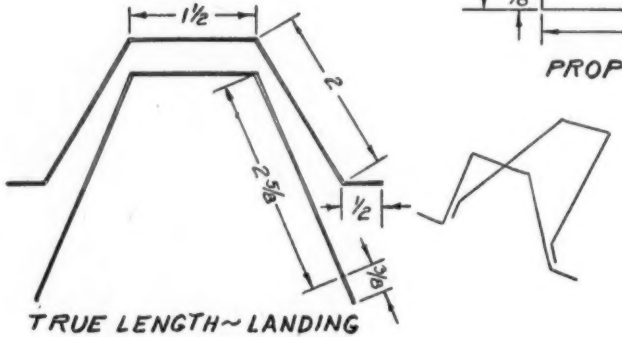


GENERAL ARRANGEMENT ~ QUARTER-SCALE

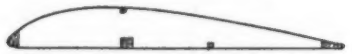





PROP DETAILS ~ HALF-SCALE

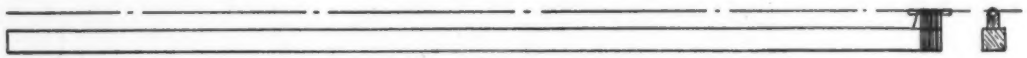



TRUE LENGTH ~ LANDING GEAR ~ HALF-SCALE



MAIN RIBS ~ MAKE 20

CENT. SEC. RIBS ~ MAKE 8
WING RIBS ~ HALF-SCALE



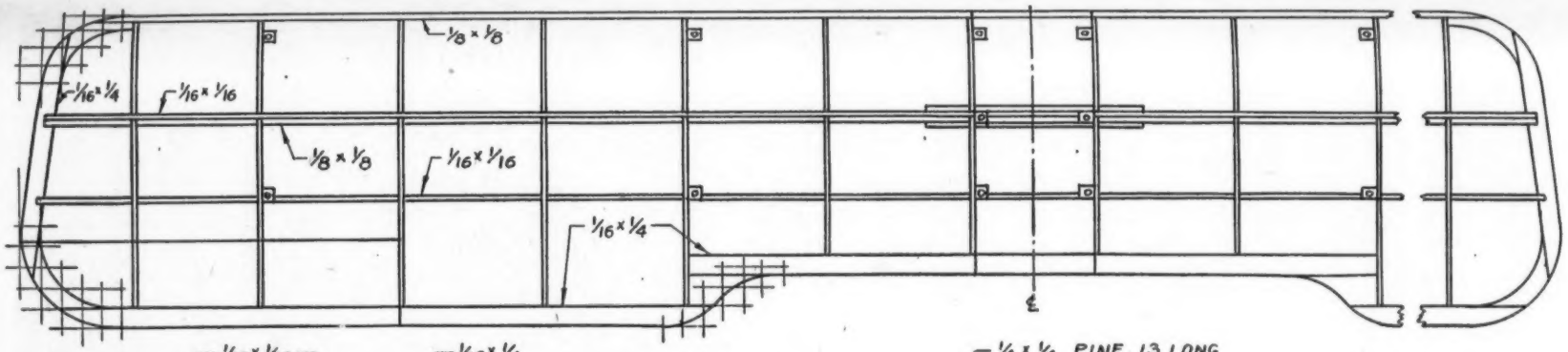
MOTOR-STICK ~ HALF-SCALE

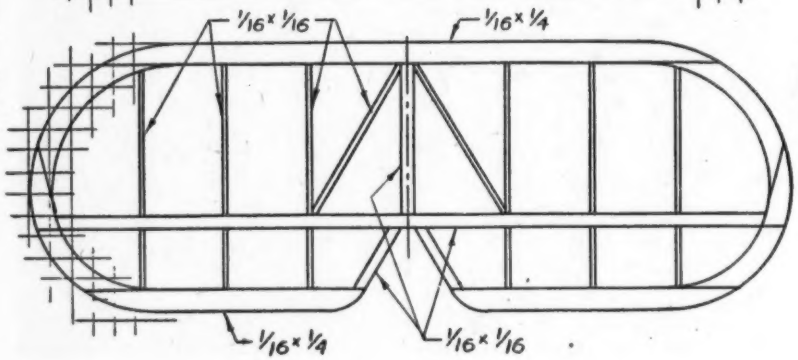
GENERAL ARRANGEMENT

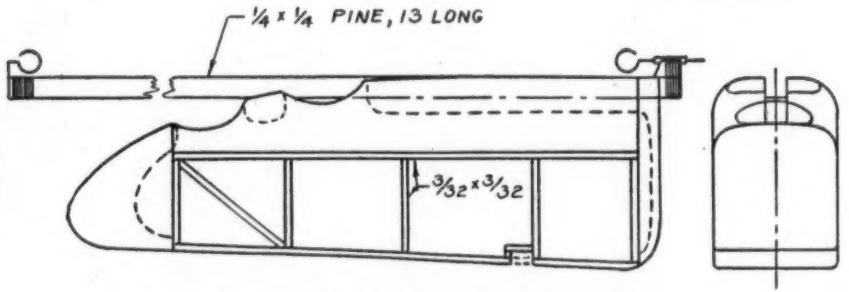
# DE HAVILLAND I

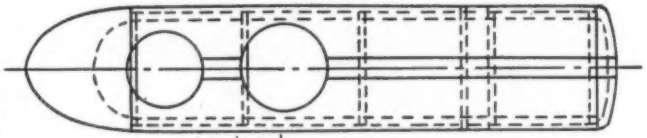
DESIGNED BY B. DANIELSEN

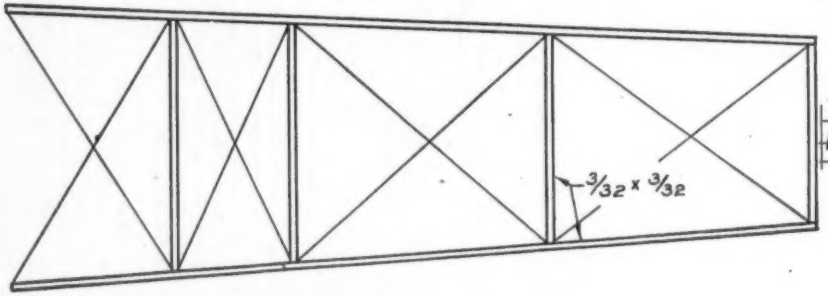
DESIGNED BY B. DANIELSEN

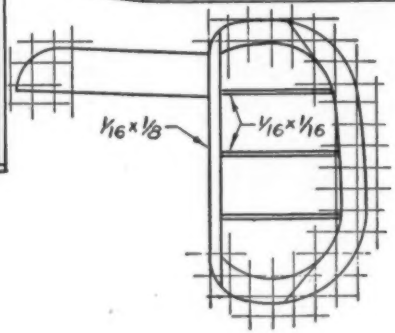





NOTE! ALL DRAWINGS ON THIS PAGE ARE HALF-SCALE

LAYOUT DETAILS

# DE HAVILLAND I

DESIGNED BY B. DANIELSEN

# design forum

**By Charles H. Grant**

THE duration of any model aircraft depends largely on the efficiency of its wing. There has always been considerable mystery surrounding the real merits of various wing sections *at model plane speeds.* Often model builders select sections used on large aircraft and assume they will be efficient on models. Many study efficiency charts and obtain results that fall short of the energy put into the problem.

This has not been due to the inaccuracy of the scientific test on these full scale wing sections, but is rather due to the *misapplication* of this data. The trouble arises from what is known as scale effect. Wings with a chord of a few inches react entirely differently than wings with the same crossection but with a chord of several feet. Any exact calculation based on full scale design is often so much in error that a good guess as to what wing section to use on a model may likely prove more accurate.

Wing sections developed from a number of years of practical experience with models have proved more effective than sections chosen from careful study of large scale wind tunnel data.

Most of the models which hold world's records today have employed wings developed by some model designer. It has been found that wings with a certain amount of undercamber provide a lower sinking velocity than other types of wing sections. However, it appears from tests at slow speed and from examples supplied by nature that wings may be made "flatter" as speed drops below two miles per hour—then, comparatively flat wings serve as well as curved ones. A typical example in nature is the butterfly.

Your problem in obtaining duration is to use a wing which gives low drag during climb and very high lift and low drag while gliding. When your model is sufficiently stable, the length of time it will stay in the air depends on power delivered by the engine and the efficiency of your wing.

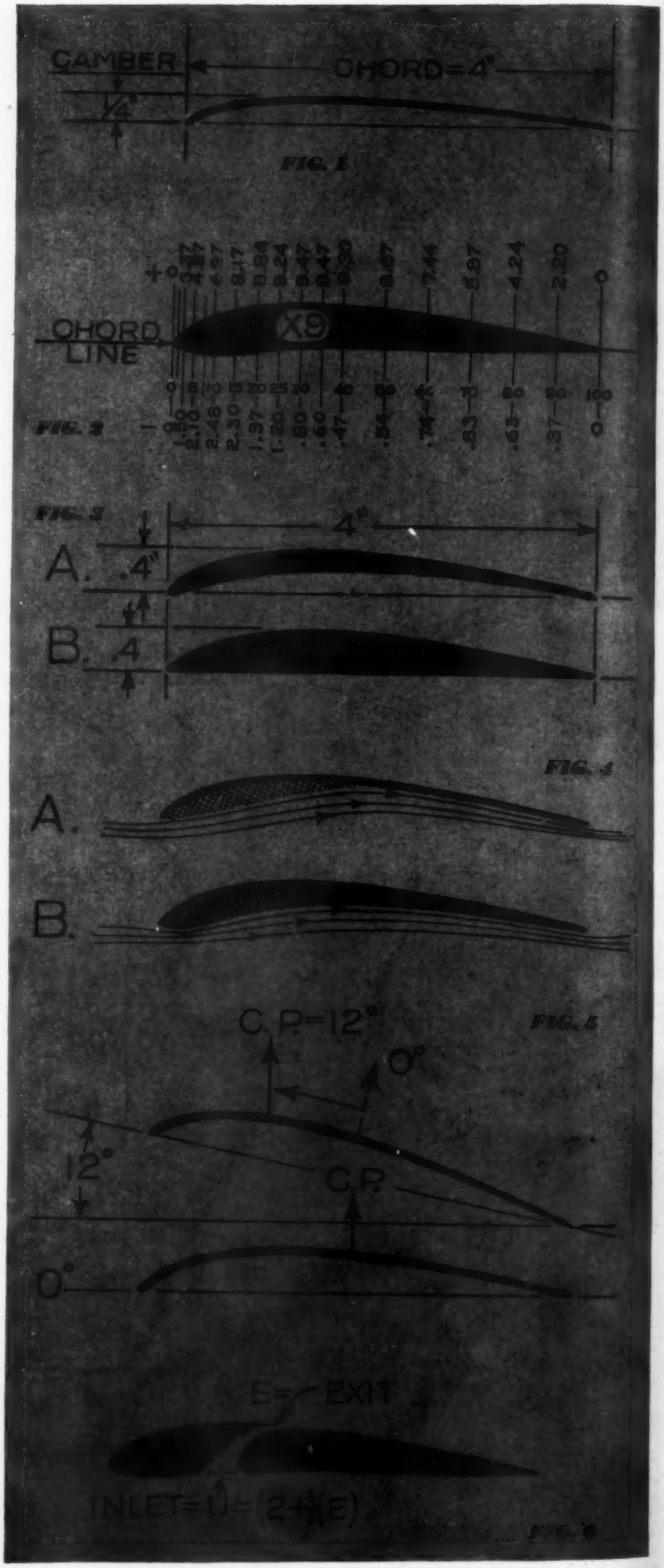
All this is based on the assumption that duration results entirely from characteristics of the airplane and excludes the chance of a wayward "thermal" whisking the plane to unseen altitudes. In the long run an efficient airplane will win more often than one of poor design, so give care to the design of your wing sections. Try designing your own.

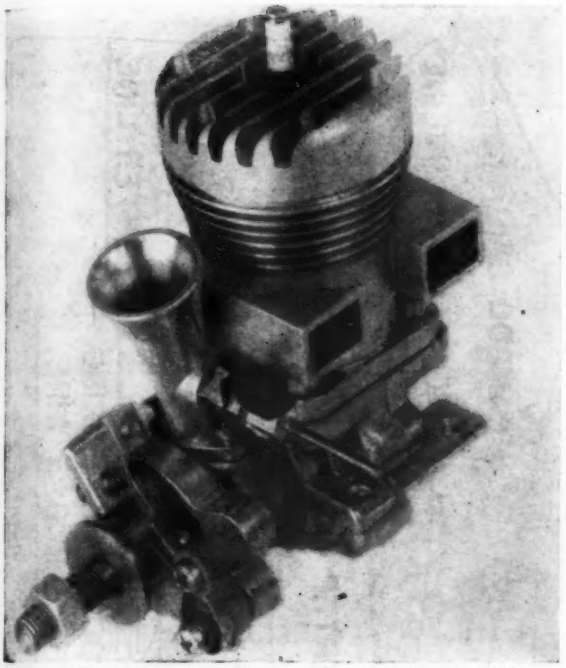
At the beginning, results may not be all you expect, but you will learn many things from the experience. Here are a few basic hints we have found helpful.

Cambered or curved surfaces are more efficient than flat ones. The height of camber (curve above the chord line) influences the amount of lift obtained at any given speed. At moderate flying angles of 1° to 8° the lift increase due to camber is approximately three times the upper maximum camber, plus the lower maximum camber, divided by four times the chord. This varies with different types of wing sections. Several other variable factors enter this problem but for the sake of simplicity this will serve as a rule of thumb. The amount of camber on any wing is the distance from chord line to the highest point of the curve of the section as indicated in Fig. 1.

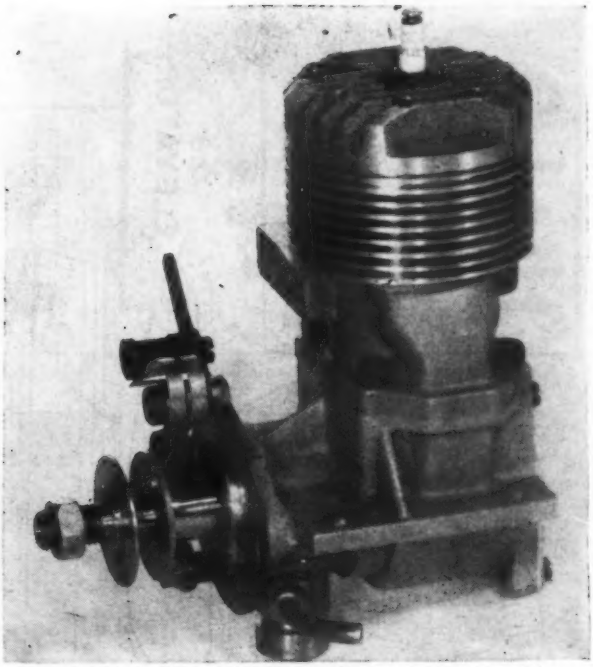
This shows a single surface wing formed by a sheet of curved wood. If maximum camber of such a section is 1/4", with 4" wing chord, we say the fineness ratio is 1/16 or 16. Thus the

(*Turn to page* 46)





The *Ball* engine has twin exhaust stacks and upright input tube



A spring-friction timer and bottom intake appear on *Bungay* engine

# Recent Racing Engines

**by EDWARD G. INGRAM**

BECAUSE so many airplane modelers are interested in speed and competition, interest in racing engines always has been great and seems to be growing. To meet the demand for more and more speed, manufacturers are striving to increase engine performance by every means possible. Established manufacturers are introducing perfected engines, and new manufacturers are bringing out engines of advanced design. The accompanying description of two of the latest designs of racing engines will illustrate the trend towards development of engines with still greater power and speed.

Until recently the manufacture of high-speed racing engines was carried out by companies located in the Far and Middle West. The situation has been changed with the announcement of the *Bungay 600*, manufactured by Bungay Brothers. The *Bungay* is based on extensive research directed towards development of a racing engine of unusually high output. Because the results achieved appear to be outstanding—and as I have had the opportunity to spend considerable time in the manufacturer's shop studying engine design features, methods of fabrication, and performance tests—I will discuss these in some detail.

I have seen a stock *Bungay* engine equipped with an 8″ diameter, 6″ pitch calibrated aluminum prop running steadily on the manufacturer's test stand at 19,400 rpm as checked by a Strobotac. I was informed other tests showed the engine will turn 23,000 rpm without load. The fuel used in all cases was a straight methanol-castor mixture. For test stand operation, peak power is stated to be reached with the 8-6 prop, but a somewhat different prop would of course be used for flight operation. Tests also were run with larger propellers. Throughout the tests it was noted the engine ran with exceptional smoothness, due to careful balancing, and that no parts failed.

Many factors contribute to the high performance of this engine. A shaft-type rotary valve is used with the port in the crankshaft in the form of a long rectangle, the width being 1/4″ and length 9/16″. The design insures a rapid opening of the valve and a large port area. The crankshaft has the unusually large outside diam. of 1/2″ at this point, which permits the inside diam. to be made large enough to provide a free flow of the fuel mixture into the crankcase.

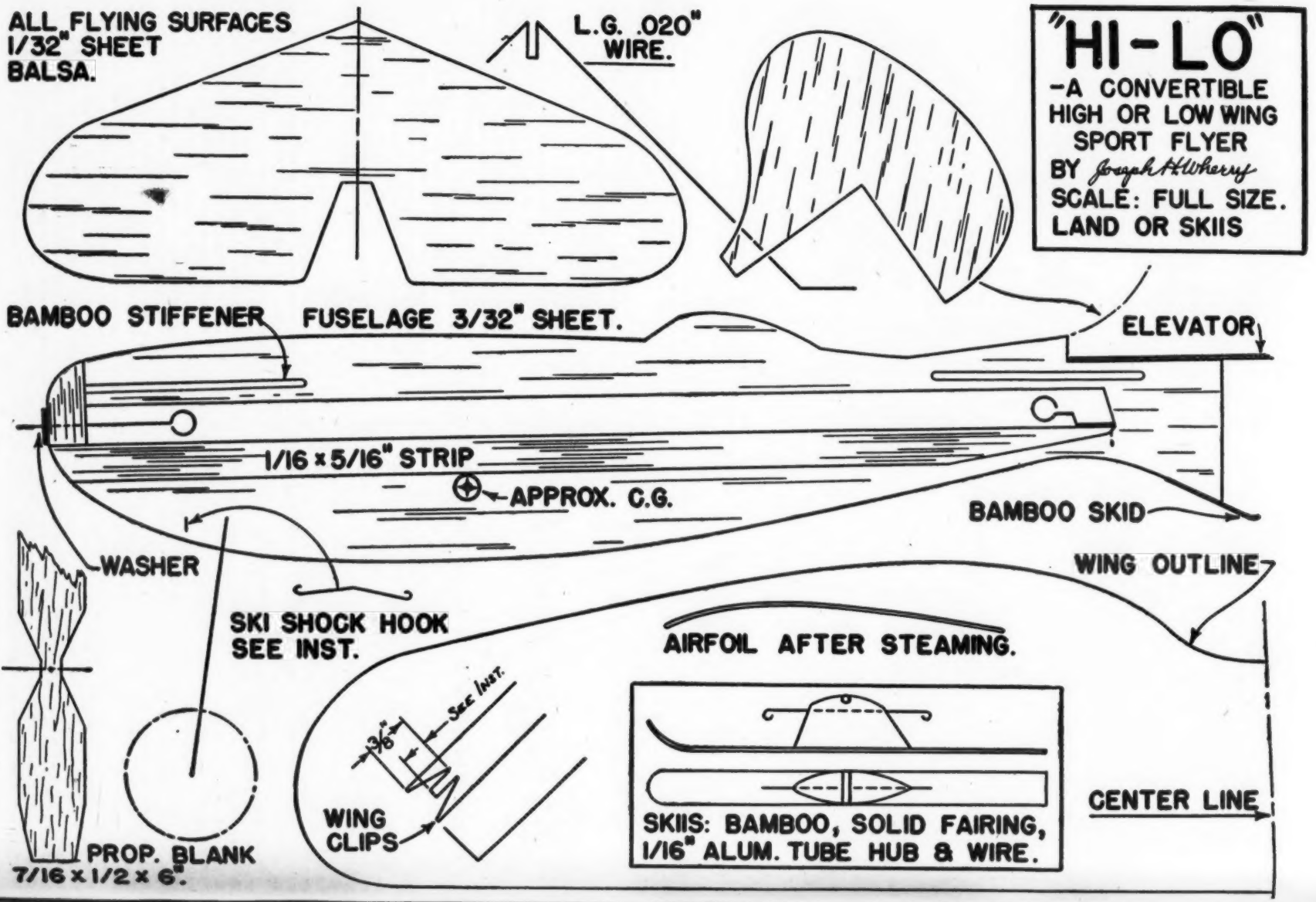
Experiments conducted by the manufacturer indicate there is a tendency for the ballbearing at the front end of the crankshaft of model engines to receive insufficient lubrication and therefore overheat. With the design of rotary valve used on the *Bungay*, oil flows freely to the front bearing where it is prevented from escaping to the exterior by a special design of oil seal for which a patent has been applied. The direct method of bearing lubrication makes it possible to seal off the space around the inner ballbearing from the rest of the crankcase by the provision of a clearance of only .003″ between the crankshaft counterweight and end of the crankcase, and thus achieve a higher crankcase compression ratio than usual.

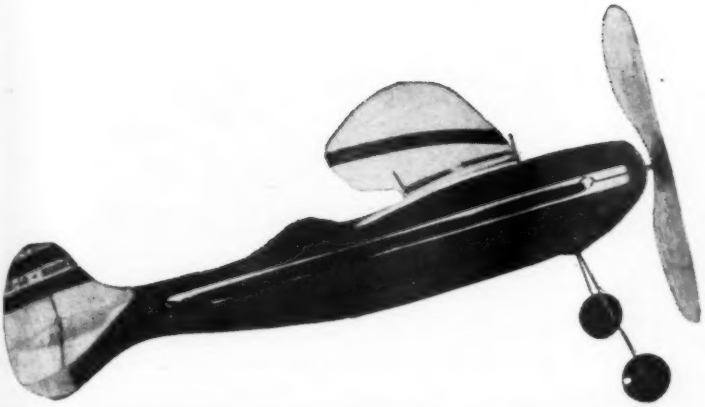
*Bungay* designers believe the shaft-type rotary valve is less subject to mechanical failure and leakage than the disk type, provides better bearing lubrication, and when designed for maximum port area is the best means of admitting fuel mixture to the crankcase.

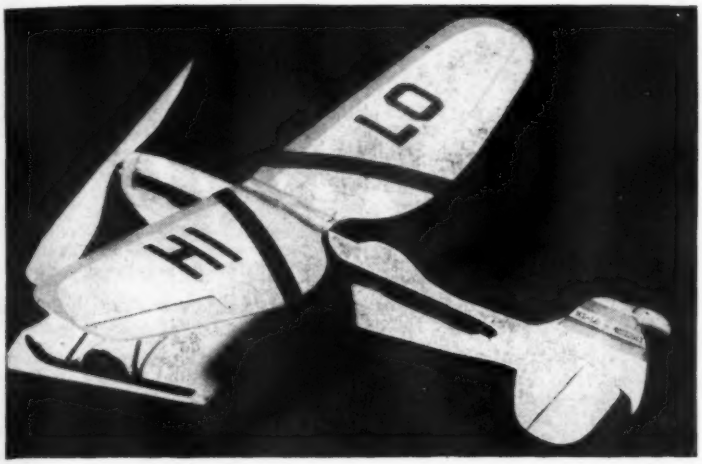
The importance of reducing the weight of the reciprocating parts of high-speed engines in order to lower bearing loads and frictional losses is well known to engineers. At the *Bungay* shop I saw the weight of the piston and rod assembly for their engine compared with that of a similar assembly for a typical racing engine of the same displacement. A delicate scale showed that the former weighed 205 grains and the latter 290 grains. That is, the *Bungay* assembly was 29% lighter. It was noted that the piston has a very thin skirt and that the connecting road, which is drop forged from 14S-T aluminum, is carefully dimensioned for lightness. No lower rod bushing is used as it was found unnecessary when the crankpin is hardened and ground to a high finish. An oil hole in the lower end of the rod leads the oil from the incoming fuel mixture to the crankpin bearing. I saw an experimental rod equipped with a ballbearing at the lower end which was tried and discarded because it appeared to provide no advantages. I also saw an experimental piston with the interior above the wristpin dammed off, which was used to study the effect of increasing crankcase compression.

Another interesting feature of this engine is that both the

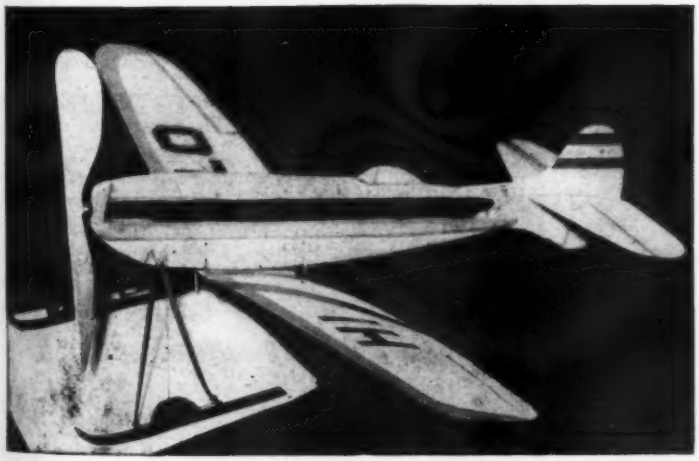
(*Turn to page* 62)


ALL FLYING SURFACES 1/32" SHEET BALSA.
L.G. .020" WIRE.
"HI-LO"
-A CONVERTIBLE HIGH OR LOW WING SPORT FLYER
BY Joseph H. Wherry
SCALE: FULL SIZE.
LAND OR SKIIS
BAMBOO STIFFENER
FUSELAGE 3/32" SHEET.
ELEVATOR
1/16 x 5/16" STRIP
APPROX. C.G.
BAMBOO SKID
WASHER
SKI SHOCK HOOK SEE INST.
WING OUTLINE
AIRFOIL AFTER STEAMING.
See Inst.
3/8"
WING CLIPS
SKIIS: BAMBOO, SOLID FAIRING, 1/16" ALUM. TUBE HUB & WIRE.
CENTER LINE
PROP. BLANK 7/16 x 1/2 x 6".






# HI-LO



## by JOSEPH H. WHERRY

HERE is a wonderful little flyer that can be in the air within two hours or so from the time you begin work. Simplicity was the watchword during the designing of the model. Although beginners will find *Hi-Lo* a good subject, more experienced model builders will also get a kick out of its performance because it climbs steeply, loops now and then, has a fine glide, and gives an all around good performance. The climb is slightly steeper as a high wing job; otherwise flights are equally good regardless of whether it is flown with wing in the high or low position.

The original model was built during the winter and was flown with skiis from snow and ice. Wheels are easily substituted and should, in fact, increase general performance because of the reduction in weight. Using the profile type fuselage, the author attempted to design this model with otherwise good looks combined with good flying characteristics. Build this little job for yourself and enjoy some fine fun-flying.

Cut the fuselage to shape from 3/32" sheet balsa of medium weight. Cut out the motor slot and place the reinforcing strips of 1/16" x 5/16" balsa along the lower edge of the slot on both sides of fuselage. Also note that small balsa strips are placed on each side of the nose. Two small strips of bamboo are also used on each side as indicated. With a large pin make a small hole through the nose for the propeller shaft, and equip fuselage with the rear motor hook which is bent from .020 wire. Bend the landing gear to shape and cement in place; likewise the small bamboo tail skid.

Cut the wings and tail surfaces to shape from 1/32" sheet balsa which has first been smoothly and evenly sanded on each side. Cement the elevator in place and then the rudder and set aside to dry. Cement the two wing halves together so they have 1-1/4" dihedral beneath each tip.

A variation of the old type wire wing clip is used on *Hi-Lo*. Using .020 wire, bend the clips to shape as shown on the plan with this exception: bend two clips exactly as shown; the other two clips are the same except that the center, or fuselage, notch is 3/8" deep. One shallow clip is placed at the wing leading edge on the top surface, and one at the trailing edge on the bottom surface. The deep clips are placed at the leading edge of the bottom surface and at the trailing edge of the top surface. This allows for the proper positive incidence for either low or high wing flying.

A conventional propeller is carved from a blank of the size indicated from hard balsa. Place the propeller shaft through the nose from the rear, slip on several small brass washers and a bead or two, then the propeller itself. Bend the shaft as on most models and cement firmly in the hub of the propeller.

If you wish wheels on your model merely slide on a pair of the correct size and bend the axle tips upward. These wheels may be purchased, or they may be carved from 1/8" sheet balsa. However, if skiis are in order, they may be made as shown by bending thin strips of bamboo over a candle flame. The small longitudinal wire with hooks is placed through the ski hub to accommodate the shock cords which are hooked to the small ski shock hook that is bent from wire and cemented in place through the fuselage as indicated. The shock cords are merely lengths of 1/16" flat rubber that have been pierced and slipped in place over the hooks on each side of the landing gear. These rubber strips hold the skiis in a neutral position and still allow for the proper tilt on landings and takeoffs.

Power is supplied by two loops of 1/16" flat rubber that has been well lubricated. If your model is slightly on the heavy side you may need an additional loop of rubber.

Decorations are up to the builder, but it may be suggested that narrow strips of colored scotch tape be used for such if desired.

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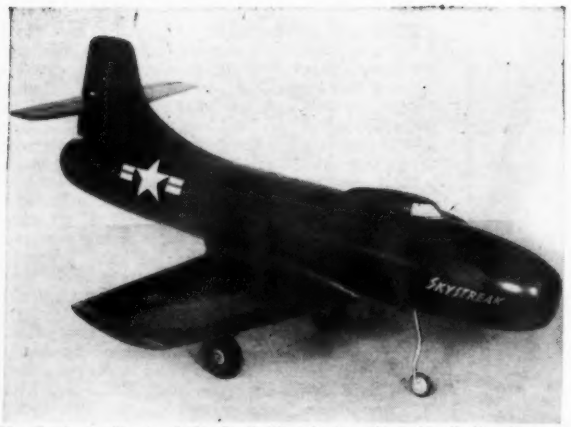
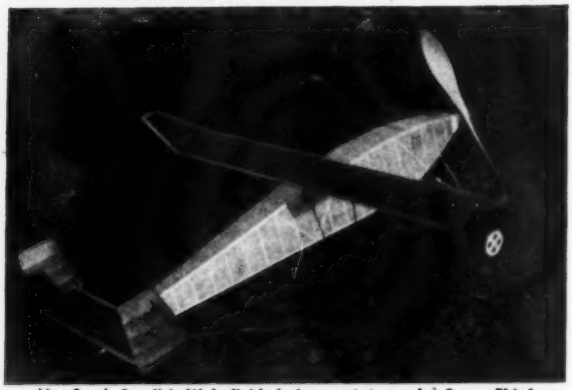
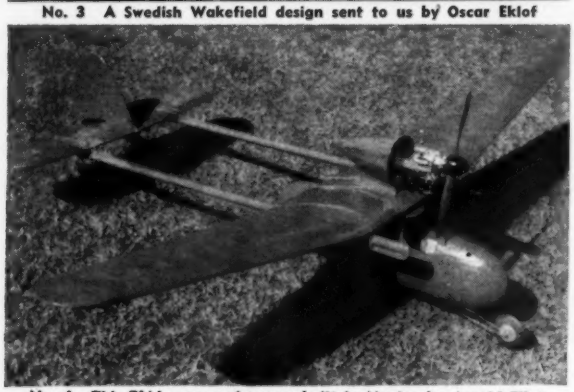



No. 2 Scale *Skystreak* by R. E. Kinsala has Dyna-Jet Redhead power

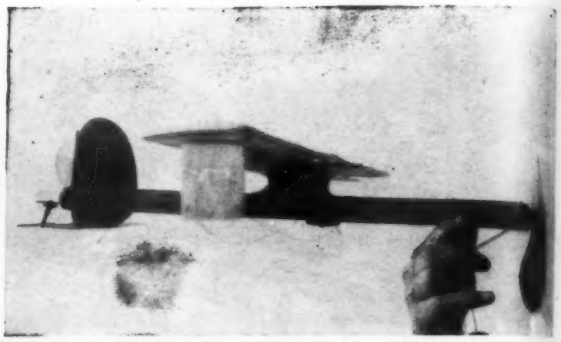


No. 3 A Swedish Wakefield design sent to us by Oscar Eklof



No. 4 This 7½′ span pusher was built in Mexico by Arnold Eliot

No. 5 Successful flyingboat by J. M. Fullarton is a real veteran



No. 1 Novelty from Allan Garmon! Controline speed ship powered by rubber

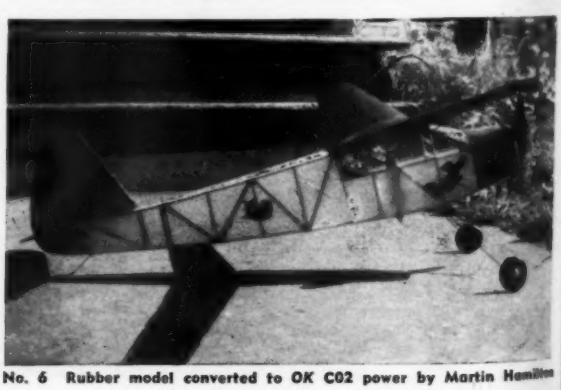
# Air Ways

## *News of Model Airplane Experimenters All Over the World*

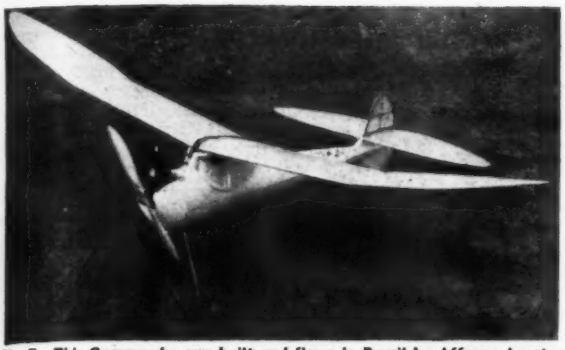
NEW CONTROLINE EVENTS. Many experienced and novice fliers have expressed the opinion that contest controline flying is getting to the stage where the usual speed and stunt events are for the specialists only. With speeds of over 150 mph now almost common among the top winners, we find fewer and fewer builders capable of standing the strain—and many feel official speeds will reach 170 mph before the year is out. Stunting, which isn't so hard on the individual, still requires untold hours of practice for the perfection necessary to enter the winners' class.

Model plane leaders have been trying out combined events in which speed, stability, workmanship and other factors are totalled up on a point system to pick the winners. In such a contest, it is quite possible for an average flier piloting an average model to come out on top. A recent event of this kind, called the "Sportsmen's Race," was a feature of the 1948 Junior National Air Races held July 4 in Cleveland, and is a good example of what may well be the coming trend. Briefly the rules were as follows:

1. No age classes, but Juniors receive an additional 15% of their total scores, and Seniors an extra 5%.
2. Point score on workmanship based on number of models in the event (if there were 100 entries, best plane receives 100 points), and scale models would be strongly favored.
3. Flyer must stay in a 6′ circle—no pylons used. Three official flights—no delays. Four laps per official and line lengths per AMA rules.
4. Stability judged by ability to fly at certain heights for 4



No. 6 Rubber model converted to OK C02 power by Martin Hamilton



No. 7 This *Commander* was built and flown in Brazil by Affonso Arantes

consecutive laps. 25 points *per lap* for flying 0 to 3' above ground; 15 points—3' to 7'; 5 points—7' to 12'. Altitude zone to be specified by contestant before takeoff.

5. Speed for 4 laps minus motor displacement used as basis for speed points.

6. Perfect takeoff and landing each good for 10 points with less points for inferior performance.

We know that contest directors will be interested in these rules and may even have tried such an event. Let us hear how things work out.

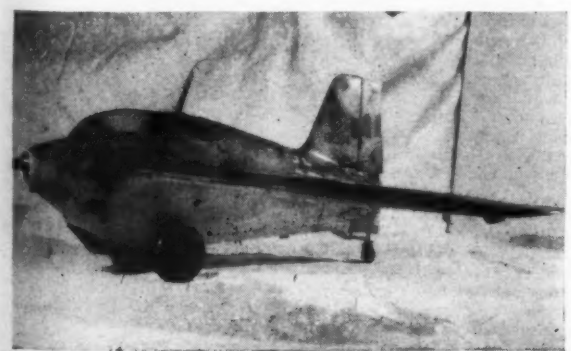
MEETS BY MAIL. A communication from Ian V. McIntosh of 28 India Lane, Montrose, Angus, Scotland informs us that his club, the *Angus and District Aeromodeling League*, wishes to initiate competitions by mail with American model clubs. Mr. McIntosh advises that his League is formed of several local clubs having a total membership of 200; though the League was formed last October, most of the member clubs are at least 3 years old. These modelers are interested in all types of flying, although controline flying is so new it is rather frowned on at present.

We suggest that interested clubs correspond with Mr. McIntosh at the above address; eventually it may be possible to tie in with model organizations in other countries as well, and so hold truly International contests by mail.

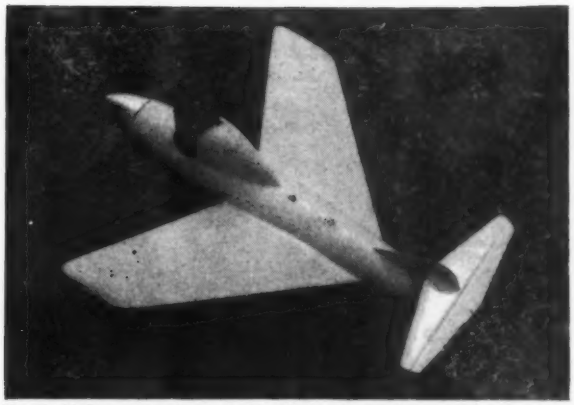
NEW POWERPLANT. Jet and rocket power units have captured the imagination of present day builders and we have seen some beautiful models built with intermittent pulse engines such as the *Dynajet*. Many builders have wished for a reliable power unit that could be used on small and lightweight models, and it appears that this wish will now be granted. A new English power unit (which should be available in this country soon) called *Jetex* has been developed especially for free flight models. We say free flight since the duration of thrust of the smaller model is about 20 seconds, hardly enough for controline work. The power unit itself weighs a bit over 1/2 oz. and is of metal.

The fuel charges weigh about 1/4 oz. and are in the form of waxy pellets that are easily inserted in the power unit. These fuel pellets are non-explosive, burn at a uniform rate with almost no smoke or flame, and are very difficult to ignite except by use of the special fuses supplied with the power unit. Total weight of the loaded unit is 3/4 oz., and a thrust of 1 oz. is generated. Larger models weighing 1.5 and 3-1/8 oz. (with fuel) produce thrusts of 2 and 3 to 4 oz. respectively.

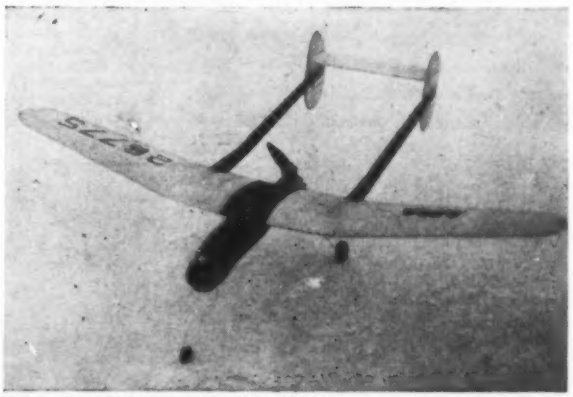
This development appears most useful to power free flight scale or duration models. Twin jet types are quite practical since the fuel is very uniform and thrust is practically constant



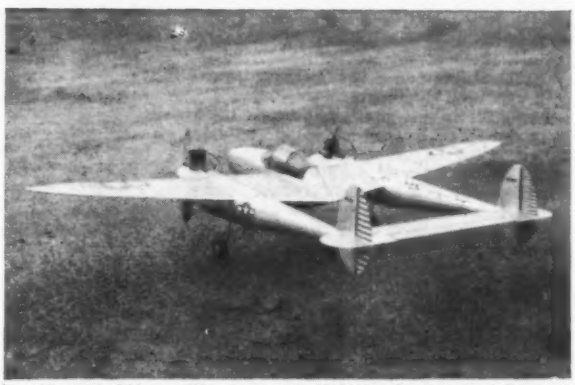
No. 12 ME 163 B by L. G. Temple won 1st place at '47 English Nationals



No. 8 McCoy powered speed ship designed and flown by Lt. B. Baker



No. 9 Free flight pusher by Wm. Malick has proven an excellent flyer



No. 10 Two *Ohlsson 60's* propel this *Lightning* by Raymond Bosworth

No. 11 C. Wells has had good luck with this *Bantam powered design*

# COMING CONTESTS

**A = Local Meet**
**AA = State or Area Meet**
**AAA = Regional Meet**
**AAAA = Nationwide Event (like Nationals, Plymouth Intern't, etc.)**

## AUGUST

15, CALIF.—Santa Barbara Free Flight
15, ILL.—Marion Lions Club (AA)
15, N.J.—Union, Irvington Flying Gremlins (AAA)
15, N.Y.—Valley Stream, F.F. (AA)
15, PA.—New Hope Exchange Club (AA)
18, MINN.—St. Paul Rubber & Glider (AAA)
18-23, MICH.—2d Plymouth Intern'l, Detroit (AAAA)
20, N.Y.—Syracuse, Hancock Field Beginners
21, N.Y.—Syracuse, Hancock Field
21-22, N.C.—Burlington North States (AAA)
22, CALIF.—Palo Alto U-Control
22, MAINE—Portland Annual Contest
22, ORE.—Medford Free Flight
22, WASH.—Seattle U-Control
29, CALIF.—Martinez U-Control
29, IOWA—Cedar Rapids Free Flight
29, NEBR.—Lincoln, State Champ. (AAA)
29, N.Y.—Hicksville, Bronx Aero Club
29, N.C.—High Point, State Champ. Rubber, CO2, Glider
29, OHIO—Avon Lake, Cleveland Controliners GMC (AA)
29, PA.—Doylestown Kiwanis Club & Kiwanis Aero Club Contest (AAA)
29, WISC.—Badger State Regional U.C., Milwaukee

## SEPTEMBER

3-4, IOWA—Marshalltown F.F. & U.C. (AA).
4-6, UTAH—Salt Lake City Douglas Trophy Contest (AAA)
5, CALIF.—L.A.A.M. Closed Rubber & Glider
5, N.Y.—L.I. Aeronuts East Coast F.F. (AA)
5, PA.—Chambersburg Exchange Club (AA)
5, VA.—Brain Busters Model Club
5-6, IOWA—Waterloo F.F. & C.L. (AA)
5-6, MO.—Kansas City Model Aircraft Inst. (AA)
5-6, OKLA.—Tulsa Model Aeronautics Club (AA)
6, ILL.—Naperville Free Flight
6, N.J.—Bedminster-Far Hills Lions Club (N.J. 32) (AA)
12, ILL.—Chicago Chi-Spinners Controline Club (AA)
12, MAINE—Augusta Flying Manics Annual Model Derby
12, MICH.—Detroit-Hydro (tentative)
12, N.J.—Middle States U.C., Passaic
12, PA.—Norristown Exchange Club (AA)
19, CALIF.—Los Banos Free Flight
19, CALIF.—Vallejo Sky Jockeys U.C.
19, FLA.—Pensacola Prop Twisters
19, N.Y.—Brooklyn Record Reckers F.F. & C.L.
19, PA.—Pottstown Gas Model Club
19, OHIO—Shelby Free Flight (AA)
22, ORE.—Salem Free Flight
26, PA.—Reading Exchange Club

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throughout the period of burning.

Construction of the unit seems to assure safety of operation, and the only apparent danger is that the power unit becomes quite hot during operation and can thus burn the fingers; this of course is also the case with all other power units that burn solid or liquid.

* *

Allan Garmon (575 Beacon St., Lowell, Mass.), Pres. of *Christian Hill* M.A.C., sent in No. 1. Built from plans in M.A.N, it was originally a speed ship, but because it did not work out too well he fitted in controls and made larger wings. 16 ft. cotton thread lines are used; however, when space is restricted, as little as 10 ft. can be used. 12 strands of 1/8" rubber powers this job. Wingspan is 23".

No. 2 was submitted by M/Sgt. R. E. Kinsala (Box 347, Sq. A, Muroc AF Base, Calif.). The fuselage is two pieces of redwood hollowed out, then glued together; the wings are planked with balsa over maple spars. For cooling the engine he has built a shroud of lightweight stainless steel with spacers to keep the jet centered in the shroud. Also, to help the cooling he made an augmenter to fit on the tail of the shroud, which isn't shown on the picture because a patent is being applied for. Heat resistant paint was used on the inside of the fuselage. It is not advisable to run the engine (on ground test) over 20 sec. because the augmenter depends on ram air for cooling.

Oscar Eklof (Schantzgatan 2A n.b., Orebro, Sweden) sent in No. 3 showing his favorite ship. It had a flight of 32 min. out of sight, and is powered with 18 strands of 1/4" flat rubber. Incidentally, he would like to exchange photos and stamps with anyone.

Unfortunately, the plane in No. 4 was completely demolished in attempting a flight during gusty wind conditions, its owner, Arnold P. Eliot (U. S. Embassy, Mexico, D. F.), tells us. Tail booms were constructed of two layers of balsa formed on a tapered golf shaft. The plane had fairly stable flight characteristics.

No. 5 comes from J. M. Fullarton (64 Summerhill Rd., Glen Iris, S. E. 6, Melbourne, Austr.). Wingspan is 5'5", and weight only 2 lbs 10 oz., with a 10 year old *Brown Jr.* motor. It gets off the water after a run of 60 or 70 ft. Although the "landings" are a bit splashy and sometimes it finishes upside down, it is not damaged. The ship is quite a veteran, having been first tested in Sydney Harbor 8 years ago, but the war intervened and Mr. Fullarton was unable to do anything with it until recently.

**Fran McElwee, top place winner in radio control event at Mirror Model Flying Fair, receives MODEL AIRPLANE NEWS trophy from Editor H. G. McEntee. Fran also was top man in controline stunt, for which he copped a large television console!**

Martin Hamilton (sent no address) had five successful flights with the model in No. 6, but can't think of any way to reduce the weight of the ship. It originally was a Scientific *Olympic* and was converted to take CO2 power. The body is covered with white Silkspan and the nose with 1/8" balsa, painted green. Span is 42" and wing is covered with red tissue; one coat of thinned dope was used on the ship to finish off.

No. 7 was submitted by Affonso Arantes (733 Alves Guimaraes, Sao Paulo, Brazil). Weight 41 oz. is far below the AMA rules, therefore the glide is really superfloating. This *Commander* has 6 ft. wingspan and is powered by a *Brown* motor. The sites suitable for free flight models are getting scarcer every day in Sao Paulo, so most of the fellows, Mr. Arantes tells us, have turned to U-control. Stunt jobs are the most popular, but some boys are working hard on speed planes, the present record being 128 mph with a *Dyna-Jet* powered model.

Lt. B. Baker (France Field, 161st Liaision Sqdn., Canal Zone) built the model in No. 8. It is his own design, a very stable and consistent flyer averaging 115-120 mph on every flight; he hopes to "up" this speed with the new *Rev-Up* props. Lt. Baker recently won 1st place at the Canal Zone Model Plane Contest for Class 5 speed, clocking in at 116 mph. (Thanks to Capt. E. L. Krum for this photo.)

Our No. 9 picture was sent in by Wm. Malick (172 Forsyth St., New York 2). His own design, it flies as nice as it looks. However, that's all Mr. Malick told us.

Raymond Bosworth (127 No. Franklin St., Washington, Penna.) mailed us No. 10. His *Lightning P-38* is silver trimmed with black and uses *Ohlsson 60's* for power. Wingspan is 4':4' and weight 4 lbs. Take-off run is about 10 ft.

No. 11 was submitted by Clarence Wells (Pres., *Bristol Aeromodleers*, P. O. Box 5, Bristol, Penna.). This plane is his own design, has been flying since May, 1947, and has an exceptionally flat slow glide.

L. George Temple forwarded No. 12. He writes: "This model, built to a scale of 1":1', is perhaps the most accurately detailed ever constructed of a military aircraft. The drawings were done by myself over a period of 4 months, directly from an actual aircraft captured intact in Germany in 1945 and placed at my disposal by the R.A.E., Farnborough. The details of internal and external coloring and camouflage were taken from a similar machine made by the same group of factories, and in this case loaned me by the U. S. military technical mission in Germany. In this way, absolute authenticity is guaranteed. The model itself, which is one of a collection to the same scale that I am building to serve as an historical record of the fighters of the second World War, and bequeathed in my will as a gift to the British nation, required 2,250 hours of building time—this time includes the weeks spent on drawings and jigs. The completed model is valued by insurance agents at £1,125 sterling." This is indeed a beautiful model and we feel the photo does it scant justice.

## NEWS OF MODELERS

K. Foster and Stan Brennan (3 Vale Rd. off Crowley Rd., Timperley, Cheshire, England) are eager to correspond with American modelers, age 16-18, as well as to exchange ideas, plans, etc. These two fellows are mostly interested in sailplanes and power models, however.

Controline and free flight gas jobs are John C. Truscott's (On the Drive, Westcliff-on-Sea, Essex, England) main interest. He would like to exchange British plans, magazine, b-o-s and ideas with an American, age 16 or so.

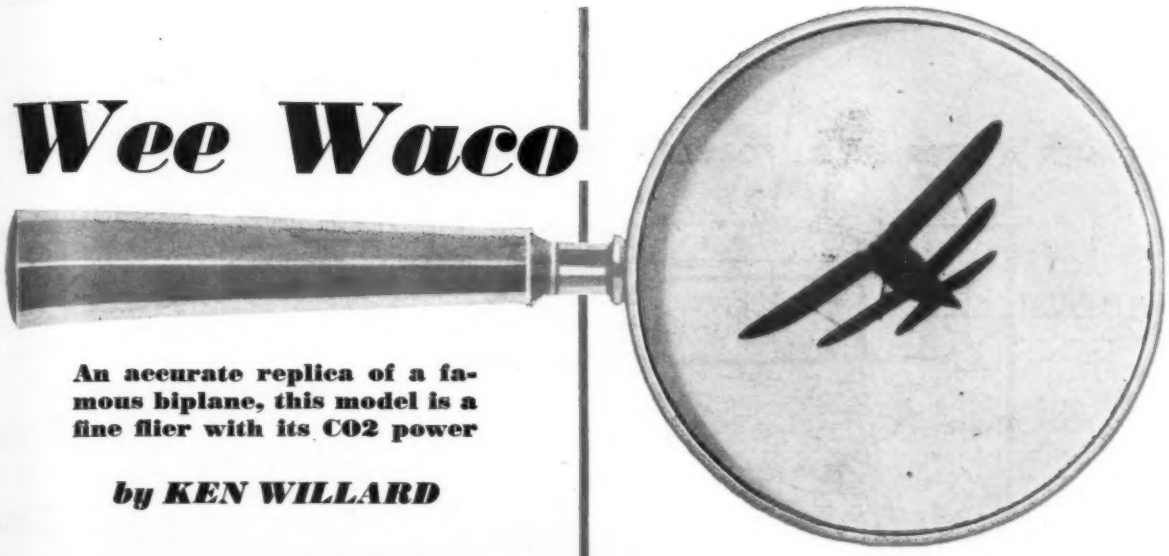
We have another pen-pal seeker interested in gas models: Norman Dakers (15 Mond. Rd., Irlam, Manchester, Lancs, England).

Representing three fellow modelers, as well as himself, T. Pumford of *Moreton M.A.C.* also would like to correspond with some Americans and interchange plans, magazines and engines. The members are all power enthusiasts and enjoy U-control the most.

John Martin-Jones (37 Redington Rd., London, N.W. 3, England) is 35 and only since the war has he seriously started

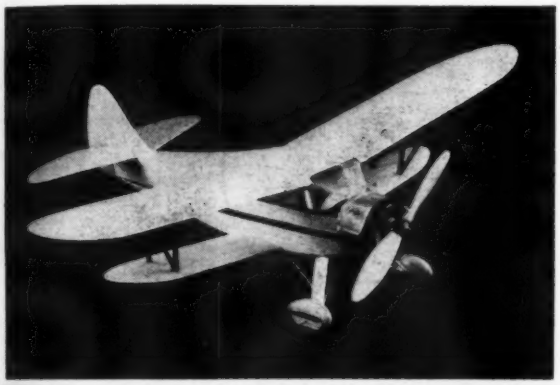
(*Turn to page* 37)

# Wee Waco



**An accurate replica of a famous biplane, this model is a fine flier with its CO2 power**

***by KEN WILLARD***



DO YOU like flying scale models? Do you like biplanes because of their realistic appearance in flight? Have you hesitated to build a free flight, flying scale, gas-powered biplane because you feared the results of a crash during adjustment, or couldn't find a suitable large open area for flying the model?

Well, here's the answer to all your problems—*Wee Waco*. If carefully constructed and properly adjusted, *Wee Waco* is one of the best scale models you will ever fly. It is ideal for those quiet summer days, and it will handle a light wind too. Best of all, you can make it in a couple of evenings.

The appearance of the CO2 engine has been accompanied by a marked increase in free flight activity because it eliminates the necessity for a large open field. As an oldtime enthusiast for free flight, I was intrigued by the possibilities of CO2, and when the Campus *A-100* was introduced any open lot became a flying field. Also, the local park board, dead set against the noisy power models, hasn't said a word against these tiny replicas of the bigger gas jobs. You will find that the only problems associated with flying the small CO2 free flight models are those connected with the adjustment—and if you've been a controliner all this time you've got some mighty interesting days ahead when you start learning the secrets of free flight adjustment. But—these little CO2 jobs will take a terrific beating because they are so light, and repair is a simple job even after a power dive crackup, since the sheet balsa construction allows it to be glued back together right at the break.

Let's get on with the construction of *Wee Waco* so we can take it over to the corner lot and do a little flying—or take it over to the controline circle and watch the boys stare in amazement as this little job flies in left hand circles, righting itself automatically when disturbed by the breeze. Be sure you have it adjusted, though, to avoid the horse-laugh. We'll talk about adjustment later.

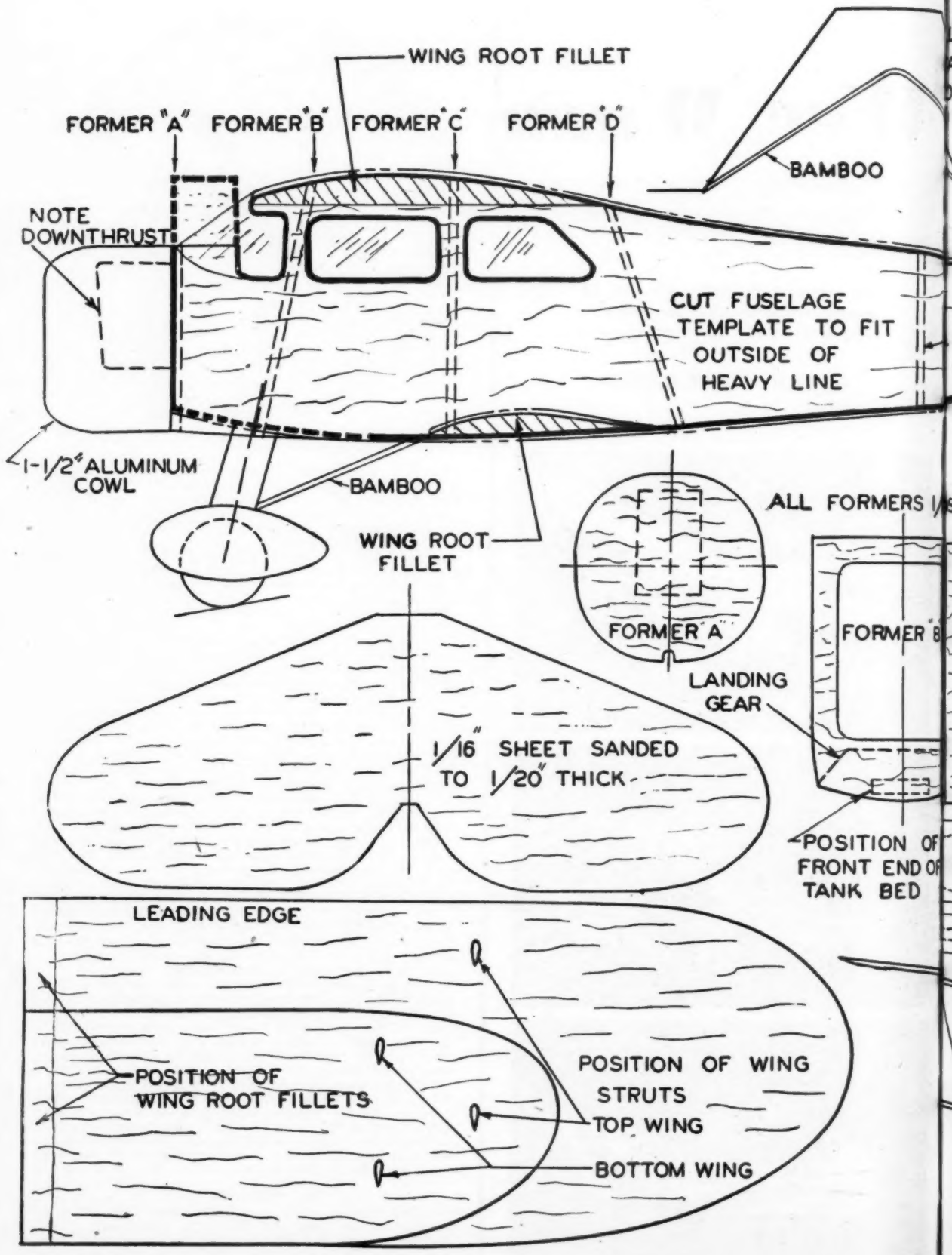
First, go to your hobby shop and select your wood. You won't need much, but it will have to be of the very light-weight variety. As you know, some balsa is three or four times heavier than other stock. Avoid such a grade. Get the very lightest grade except for two pieces—the engine mount and the tank bed which should be of medium grade (not heavy!) balsa.

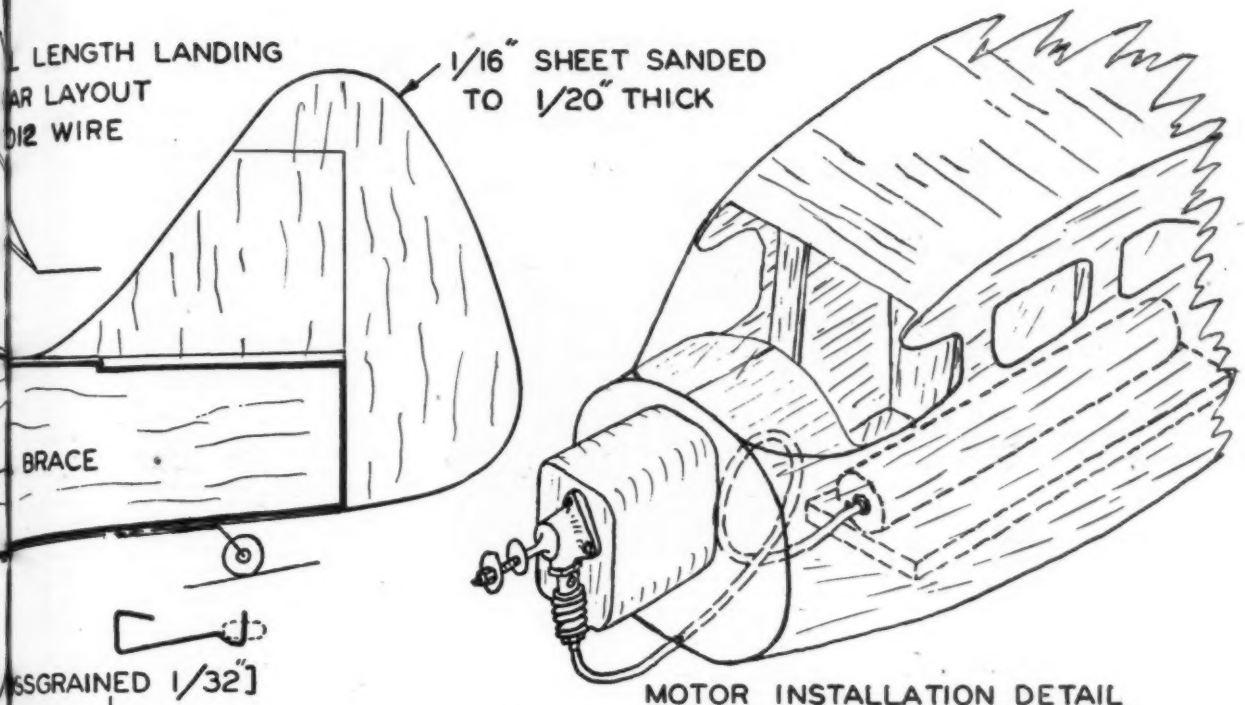
Study the plans for a few minutes and look at the photos. After you have the general idea pretty well in mind, make templates for the fuselage sides, formers, wings and tail surfaces out of stiff paper by tracing directly from the full size plans. Be sure to cut the fuselage side template to fit the outside edge of the heavy outline. Now you are ready to make the fuselage.

## FUSELAGE

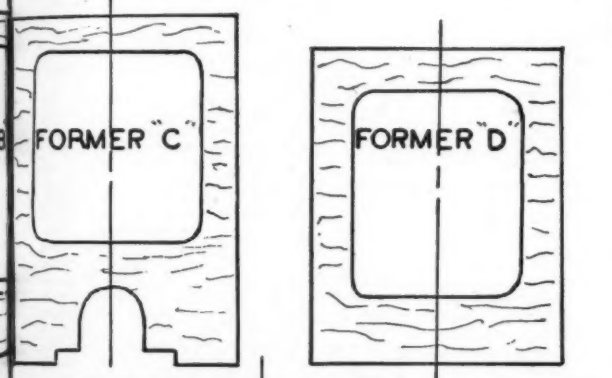
1. Cut fuselage sides from 1/32" sheet balsa. 2. Cut fuselage formers from 1/32" sheet. Cut two of each, grain upright on one and sideways on the other, then glue together crossgrained. 3. Glue 1/16" square brace on *inside*

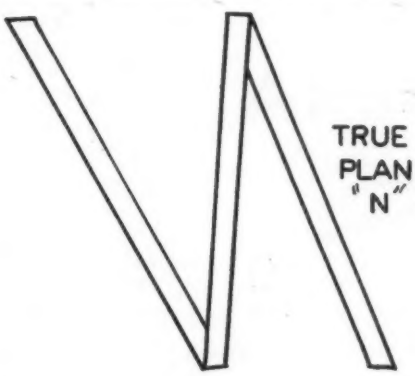
(*Turn to page* 52)


WING ROOT FILLET
FORMER "A"
FORMER "B"
FORMER "C"
FORMER "D"
BAMBOO
NOTE DOWNTHRUST
CUT FUSELAGE TEMPLATE TO FIT OUTSIDE OF HEAVY LINE
1-1/2" ALUMINUM COWL
BAMBOO
WING ROOT FILLET
ALL FORMERS
FORMER A
FORMER B
LANDING GEAR
1/16" SHEET SANDED TO 1/20" THICK
POSITION OF FRONT END OF TANK BED
LEADING EDGE
POSITION OF WING ROOT FILLETS
POSITION OF WING STRUTS
TOP WING
BOTTOM WING

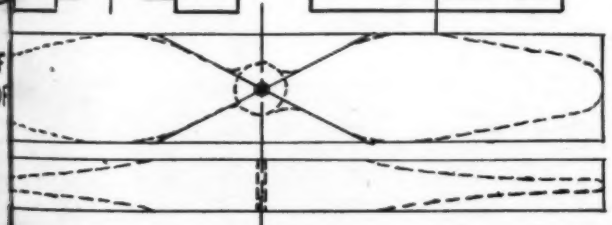



MOTOR INSTALLATION DETAIL

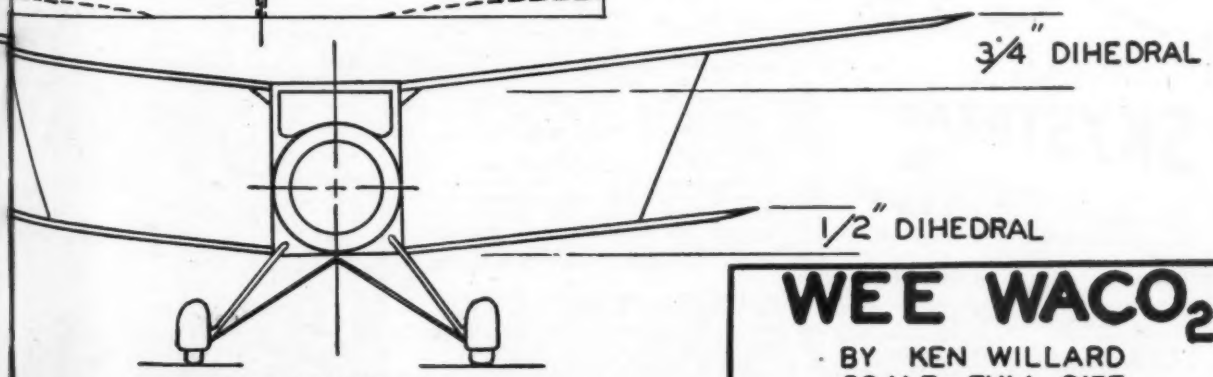


TRUE LENGTH PLAN LAYOUT OF "N" STRUTS



PROPELLER BLOCK FULL SIZE




SCALE - HALF SIZE

# WEE WACO 2

BY KEN WILLARD
SCALE - FULL SIZE
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# REPORT FROM THE WEST

by "Tip" Hannon

One reason why L.A.A.M. members like contests! Barbara Bates of Warner Bros. helps Ted Gillett with his trophies; club members can detect an unusual gleam in Ted's eye

Our guest writer this month is a founder of the *Los Angeles Aeromodelers*, who gives some valuable hints on the formation of an "area" club by describing the evolution of the *L.A.A.M.* and some of the problems they have overcome. Without further ado, we turn you over to Ray Acord:

## By Ray O. Acord

WHEN asked to give a history of the *Los Angeles Aero Modelers*, it occurred to me that the story could be presented in such a way that the experience gained by this organization might help other clubs.

The name is very important. Some 12 years ago the Gas Model Airplane Association of So. California was organized and incorporated as a non-profit group. Incorporation is a good idea for the protection of members. Several years later the name was changed to *Los Angeles Aero Modelers* for several important reasons, one being that the old name was too confining, inasmuch as it specified only one type of modelling. Its new name encouraged all types of model builders to join. Another reason was that the old name covered too much territory and did not directly associate the club to any one city or town. This is quite necessary if the club expects to seek aid from local organizations such as the Chamber of Commerce, newspapers and other local service clubs.

Almost immediately after the name change, the club expanded to such an extent that meeting places became a problem, and members had to travel up to 30 miles to attend meetings. It was decided at this time to set up the *L.A.A.M.* as a Council to direct and help other clubs. The members (over 250) joined small clubs in their neighborhood, and if none existed they organized new clubs with the help of local dealers.

The *L.A.A.M.* Council was then made up of the President and a duly elected representative of each club affiliated with the *L.A.A.M.* These clubs are known as "Wings" of the *L.A.A.M.*, but maintain their individual names such as: *Thermal Thumbers, Lakewood Model Association*, etc.

The latest count showed over 20 "Wings" in and around Los Angeles. The Officers of the Council are elected from this group. Present Officers are:

President—John Acker of *Flight Masters*
Vice-Pres.—Ray O. Acord of *Flight Masters*.
Secretary—Andrew Peterson of *Thermal Thumbers*.
Treasurer—Frank Greene of *Lakewood Model Assoc.*

It is an interesting fact that John Acker is a U-Controller, Ray Acord a Free Flight builder, Andrew Peterson a Glider and Indoor builder, and Frank Greene a Rubber modeler. This perfect harmony applies to the whole organization. U-Control, Free Flight, Outdoor Rubber and Glider, Indoor Rubber and Glider, and now Race Car modelers are all working together to accomplish the aim and purpose of the *L.A.A.M.*—which is to improve and encourage modelling, both for the model builder and the model industry.

Due to this combined effort, we have accomplished projects that would have been almost impossible for any one group to do alone.

This has also enabled the *L.A.A.M.* to remain self-supporting, and to maintain their field at Western & Rosecrans. The field consists of 5 U-Control circles, 2 Free Flight circles, space for Rubber and Glider models, a strip for Radio Controlled models, a very fine 84 ft. cable race track, and the newest addition—a 35 ft. cable track for miniature race cars with engines under .30 cu. in. displ. Present plans call for another race car track, and hopes are high for a boat pond. Another accomplishment of the combined clubs is insurance, as a large organization can obtain insurance at a cheaper rate. At present the insurance for *L.A.A.M.* costs each member $1 per year, and they are covered for $5,000 Public Liability, and $10,000 Property Damage. (This policy has been offered to the A.M.A.)

Sources of revenue for the *L.A.A.M.* are derived from membership dues, contest entry fees (some 25 contests were held last year), advertising sign space sold on the race car track crash wall, and percentage from concessions at the field. This includes two trailers with model supplies and refreshments.

A great deal of the success of the *L.A.A.M.* can be attributed to the close harmony of the model builders and members of the Model Industry—manufacturers, jobbers, and dealers. In our organization you will find industry leaders such as: Irwin Ohlsson, Ray Acord, Bill Atwood, Frank Green, Johnny Brodbeck and Lud Kading, Virgil Clark and Grainger Williams, Duke Fox, Eddie Kapitanoff and Harry Balaban of Western Model Distributors, Bob Morgan of Morgan Model Supply, and others. These leaders work with other *L.A.A.M.* members who are expert modelers and who contribute a world of technical knowledge, also help promote contests and programs to encourage young modelers.

(*Turn to page* 36)

It is easy to see from this shot that Ray Acord, father of the L.A.A.M. idea, has been a busy contest flier during his modeling career

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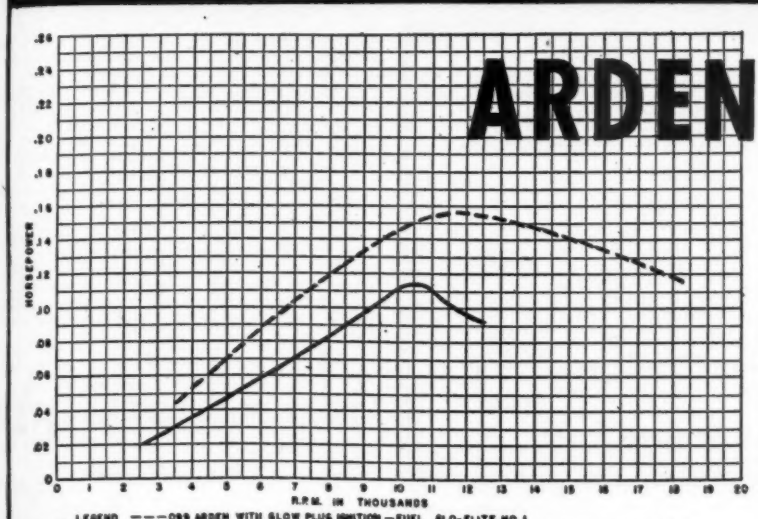
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The **"BOX-CAR"** is stable and highly maneuverable and has won many contests.

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AUTOMATIC TIMER ADVANCE NOW AVAILABLE FOR CAR ENGINES

Bungay "600" Engines are designed and built for long life at high R.P.M. Bore .940"; Stroke .875"; Displacement .607 cu. in. Compression ratio 9.8-1. Ball bearing equipped. Hardened steel cylinder sleeve Aluminum piston with two rings. Timers are calibrated at maximum H.P.

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These members of the industry have been no end of help and should always be encouraged and solicited for aid. Most progressive industry leaders know they will receive benefits for their efforts in helping model clubs. However, this works both ways. It's a mutual aid program, and it is only natural that the industry members have an influencing factor in broadening the scope of model activity. Running an organization of this size and type requires unselfish attitudes, and keeping open minds on types of modelling other than that which you yourself like and build. In a short time you can bring together experts in the various types of modelling.

Another bit of knowledge gained through experience is that the *L.A.A.M.* is now completely back of the A.M.A. They strongly believe and advise in the support of this governing body for Model Aviation. Each club should have an A.M.A. Leader Member in its membership to keep the members posted on rule changes and other problems and items of interest.

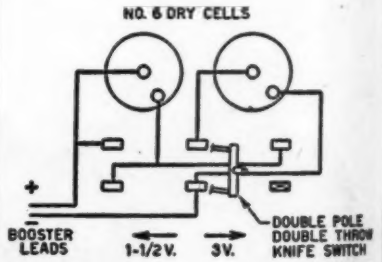
At present, there are 9 Leader Members and Contest Directors in the *L.A.A.M.* By adopting and accepting the A.M.A. rules, our organization has had more time to build and enjoy flying models, instead of bickering about rules. This is evidenced by the fact that in 2 years since adopting A.M.A. rules we have turned out such champion and A.M.A. record holders as: Frank Cummings, Don Newberger, Ray Acord, Ted Gillett, Lew Mahiew, Bill Atwood, Les McBrayer, Ed Sharp, Troy Burris, Don Kennedy, Royce Childress, David Wade, *Thermal Thumbers*, and others. This year we're out to beat more records than ever!

---

# DUAL PURPOSE BOOSTER

**by George H. Schulz**

IT is sometimes desirable to be able to change between 3V and 1½V output with your only set of boosters. This is especially true when you own and operate both glow-plug and standard-ignition engines. Some modelers have less sensitive dispositions and don't mind hard starting troubles with 1½V boosters and standard ignition, or burned out glow-plugs from overheating with 3V.




This diagram is the answer to these flying-field blues. Two regular No. 6 dry cells, a double-pole double-throw knife switch (from the nearest "dime" or electrical store), and some heavy hookup wire are all that is needed. The small rectangles in the diagram represent the six poles of the switch, the center two being the ones to which the blades of the switch are attached.

After wiring as shown in diagram, the switch can be taped to the batteries with adhesive tape. As the diagram shows, throwing the switch one way will give 3V through the booster leads, and the other way gives 1½V. No fuss, just happy flying all day long!

## Airways

(*Continued from page 30*)

aeromodeling. His chief interest: free flight, controline (particularly in experimental stuff), scale and semiscale power models. He also would like to exchange some of the British lightweight diesel engines for American engines and kits.

Another Englishman, J. W. Headley (15 Louis St., Spring Bank, Hull, Yorkshire, England), a regular reader of M.A.N., would like to swap copies of the AEROMODELLER for MODEL AIRPLANE NEWS.

G. Walsh (P. O. Box 1190, Christchurch, New Zealand) desires to write to a fellow on our West Coast. His prime interest is in gas and sailplane models.

Andre Bernard (2 Avenue du General de Gaulle, La Garenne—Seine—France) is eager to correspond with an American modeler and interchange French magazines, plans, etc.

C. Petty (107 Coalpool Lane, Walsall, Staffordshire, England) would like to be a pen friend of any American, about 18 years old, exchanging engines and magazines.

From Germany we received Rudolf Tuettner's request (20 Braunschweig, Am Augusttore 2, British Zone) to correspond with some one equally interested in models.

L. A. C. Eastoe, 2307931 M. H. (Tasks Section, Stock Control Office, 16 Maintenance Unit, Royal Air Force, Stafford, England) would like to write to an American modeler, about 20, who is chiefly interested in diesel and rubber driven models.

Another pen friend is sought by Mr. Ingles (192, The Vista, Eltham, London, S. E. 9, England).

If you are about 18 years old and favor U-control as well as free flight gas models, George Markey (2 Trelawney Rd., Barkingside, Ilford, Essex, England) would enjoy starting a correspondence with you.

R. Munday (131 Ridgeway Dr., Bromley, Kent, England) would like to contact some American, in his twenties, interested in swapping magazines, kits and engines. At present his main specialty is controline flying, but he also enjoys free flight power.

Jose V. Ribeiro de Almeida (R. do Nogueira, 412, Oporto, Portugal) member of *Grupo Independente Aviominiaturisto* is searching for the latest info on model matters. He writes that everything costs "several dollars"—even if it is only a spark plug!

Peter Cartagena (19 W. 111 St., Apt. 1W, New York, N.Y.) wishes to exchange a rubber powered plan and kit with a youngster 13 or 14 years of age.

P. J. Adams (6 Oaklands Ave., West Wickham, Kent, England) would like an American pen friend who wants to exchange merchandise. His interest is chiefly free flight and U-control.

Michael J. Lee (Uplands, Portmore Park Rd., Weybridge, Surrey, England) desires to trade any merchandise, plugs, kits, etc. He would also like to know how to get more *speed* with his models. At present, he is hunting for a new *McCoy*.

B. Akiens (66 Victoria Rd. North, Leicester, England) is 14 years old and would like to write to an American of the same age mainly interested in control line models and gliders.

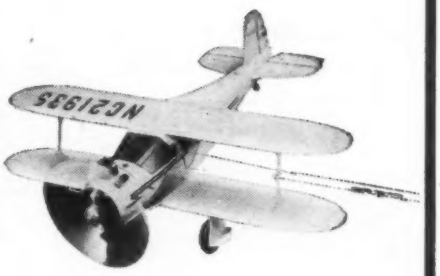
Another pen-pal seeker, Alan A. Parker (111 Casewick Rd., W. Norwood, SE 27, London, England), is eager to in-


**Beechcraft** MODEL 17

PREFABRICATED—For engines of .099 to .49 displ., glow plug, ignition or diesel. Wingspan 24", length 21". This kit is 100% complete including a finished balsa fuselage, carved inside and out; finished aluminum cowling ready to attach; leading and trailing edges, shaped and notched.

Formed landing gear, bell crank, decals, gas tank material, silkspan, tail wheel, metal hinges and die-cut parts. Shaped rudder, stabilizer and elevator. All grade "A" balsa and a set of full size easy-to-follow plans.

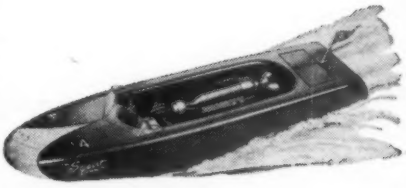
**$5.95**



**$CO_2$ Squirt**

The Squirt was designed especially for use with $CO_2$ engines similar to the O K Herkimer and Campus A100. The model is easily built from the complete kit which contains die-cut parts, flywheel, 3-bladed metal propeller, propeller shaft and housing with rubber tubing universal joint. All necessary hardware including motor mounting bolts and propeller nuts. The Squirt measures 12½" long with a 4" beam. Ask your dealer for this newest Scientific kit.

**$1.50**



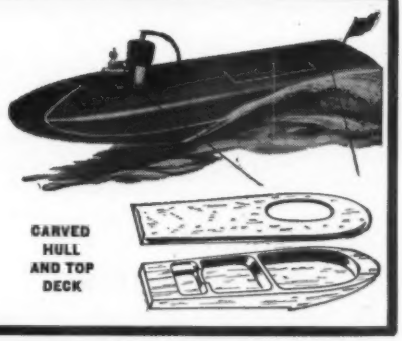
**Buckeye**

Class "E" length 17", beam 5⅛", weight 2 lbs. for engines of .099 to .49 displ. Kit contains carved hull, cast metal propeller, shaft and housing, hardware, decals, etc.

**$4.95**

UNIVERSAL JOINT 75c

1-1/4" FLYWHEEL 75c

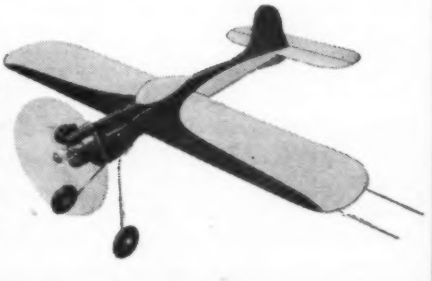


CARVED HULL AND TOP DECK

**Stunt Ace**

For Classes B and C. Uses engines of .23 to .65 displ. Wingspan 40", chord 7", length 27". Capable of performing all stunts including vertical and horizontal eights. Kit includes completely finished leading and trailing edges which are shaped and notched for ribs, formed landing gear and clip, complete hardware down to the last nut and bolt, along with a full size detailed set of plans. Designed by National Champion Bob Tucker the Stunt Ace has placed FIRST in many contests throughout the country.

**$3.95**



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terchange magazines and plans. He is 17 years old. Free flight rubber, lightweight and free flight gas are his prime interests. He has several British and continental diesels from 1 to 2 c.c. that he would like to swap for some "Yank" gas engines and power accessories.

Howard Evanson (5616 40th Ave. So., Minneapolis, Minn.) would like a pen friend anywhere in the U.S. He is 14 and enjoys speed control line flying best. Howard would like to trade plans and designs.

## CLUB NEWS

### California

Changes in AMA contest rules for '48 offered additional opportunities for model airplane builders to establish new national records Jack Ritner and Larry Giordanengo, members of *San Francisco Pterodactyls*, took advantage of this opportunity. In the recent Spring Glider Tournament sponsored by S F. Recreation Dept., AMA sanctioned, Jack Ritner's time was 2:42.2 for class B hand launched glider, and Larry Giordanengo's made 1:49.2 with a class E towline glider—both in the Jr. division. These records were made in the sand dune area of S.F. under extremely difficult flying conditions.

Results of *Los Angeles Aero Modelers'* Free Flight Gas contest held June 6: Class A—Allen Trainor 20:31.8; Class B—Allen Trainor 26:32.6; Class C—Hans Wall 30:00.0; Class D—Frank Downs 29:00.4; Jr. Awards—Daryl Sheperd; Ladies' Award—Leta McAllister.

Results of June 6 Hydro Contest sponsored by *San Francisco Vultures:* Andy Tagliafico was high point man for the day, winning the Class A & B gas (2:49.8) and the rubber powered events (2:49.7); Class C & D gas was won by Bill Gunther (2:37.6).

Meet results of *San Rafael Air Pirates* (formerly *Aeromaniacs*) held at Marin Jr. College Field on June 13: Class A Speed Jr.—J. Pacheco 56.00; Sr.—E. Huth 105.88. B Speed Jr.—R. Vlavianos 100.00; Sr.—Richards & Forrest 112.00. C Speed Jr.—D. Holm 116.88; Sr.—H. Siman 127.20. D Speed Jr.—M. Brown 125.00; Sr.—A. Flanders 131.38. Women's—Helen Mayes. Team—Harvey, Thunberg & Pedracci. Flying Scale—Johne Waterman. Novelty—J. McDonald. Class A Precision Jr.—D. Hollfelder 240.5; Sr.—A. Ratzlaff 322. B Precision Jr.—E. Stiles 346.5; Sr. W. King 320. C Precision Jr.—J. Pedracci 275.5; Sr.—T. Van Dyke 371.5. D Precision Jr.—E. Stiles, 274.5; Sr.—R. Regalia 338.

*Thermal Thumbers* of L. A. elected new officers for the next six months: Frank Cummings (National champ), Pres.; Rodger Jensen, Vice Pres.; Loren Salisbury, Treas.; Duane Wilson, Corres. Sec.; Publicity, E. J. Weathers.

### Florida

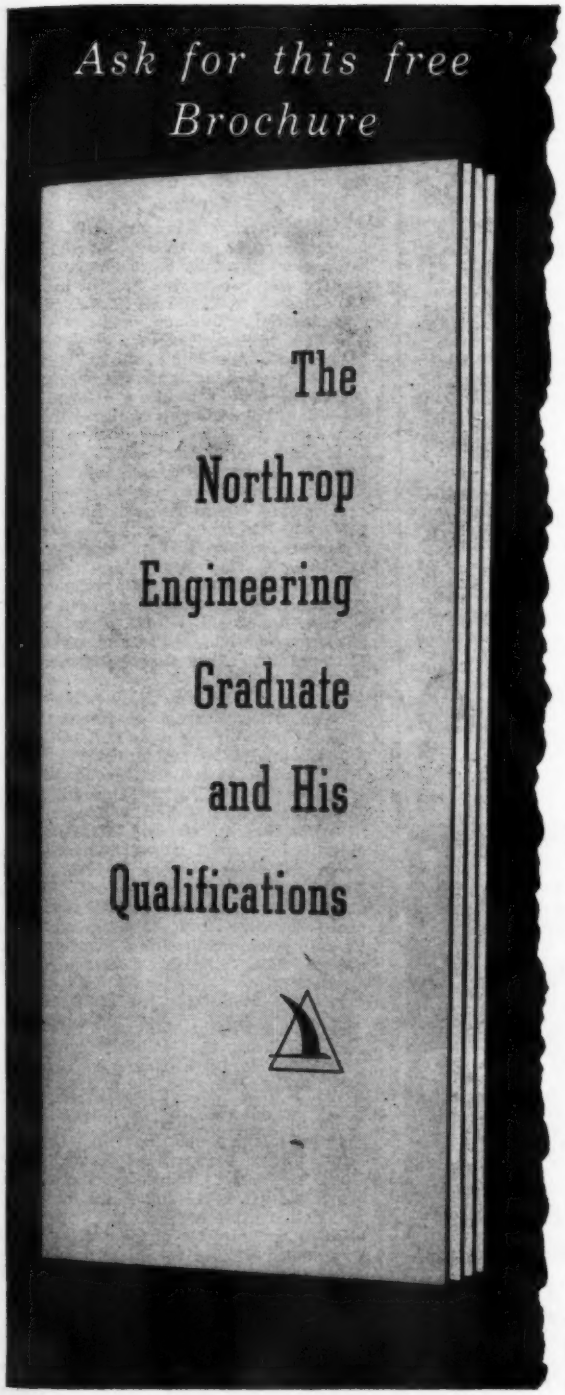
A new club has been formed at Daytona Beach—*Daytona Model Plane and Car Club*. Officers—W. T. Thomas, Pres.; Leon Sparkman, Vice Pres. of the plane division; Lawson Diggett, Vice Pres. of race car division.

*Arcadia Flying Devils* have been organized and intend to join the F.A.M.C. and later the AMA, we learn from "The Skyscraper News."

Also, at Dade City a new model club was recently formed with the temporary name of *Pasco Power-Divers*. Contact James E. Stubbs, Box 132, Dade City.

A small group in the state capital are interested in knowing of any contests or meets to be held throughout Florida.

*Ask for this free Brochure*

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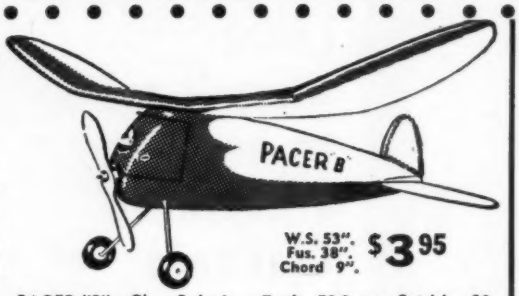
**L. D. GLOW FUEL SETS WORLD SPEED RECORD!**




W.S. 53". Fus. 38". Chord 9". **$3.95**

PACER "B"—Class B Junior—7 min. 50.8 sec. Set May 30 at Lakewood, Long Beach, Calif.

L.D. GLOW FUEL—Class C Junior Speed—116.5 MPH. Set June 6 at Mirror Model Flying Fair by Walter Wagner of the Bronx, New York.

LIQUID DYNAMITE CONTEST FUEL **$1.95 pt.**

L.D. GLOW FUEL **95c pt.**

**READ WHAT THE AMA SAYS ABOUT PACER "B"!**
"Particularly noteworthy is the fact that the model is exceptionally heavy, weighing 40 oz. with a wing loading of 13-1/3 oz. per sq. foot."

**READ WHAT WALTER WAGNER SAYS ABOUT L.D. GLOW FUEL!**
"I have tried many different makes of Hot Fuel and found Liquid Dynamite the best of all. It revs my engine faster and runs it more smoothly. At all the contests I placed in, I used Liquid Dynamite."

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At a recent local Polk County Meet, the *Balso Termites* of Lakeland came out first, *Bartow Prop Busters* second, and *Lake Wales Dope Fiends* third. Top speed for the meet was 95.20 mph by Sam McMahen of Lakeland. High Stunt points went to Vincent Pickett of *Bartow Prop Busters.*

### Illinois

*Chi Spinners* will hold their 2d Annual Contest Sept. 12, AMA sanctioned, at Calumet Park, East 95 St., Chicago. Speed, Stunt & Combat entries. For further info: Dick Brown, 2818 E. 79th St., Chicago 49.

### Kansas

Results of the 5th Annual Kiwanis-YMCA Model Airplane Meet held May 30-31: *Free Flight winners.* Class A Gas Jr.—Maurice Pollock; B Gas Jr.—Dan Dougherty; D Gas Jr.—Stephen Carter. H-L Glider Jr.—Jerry James. Class A Gas Sr.—Robert Hurford; B Gas Sr.—Robert Hurford; C Gas Sr.—Ed Metz; D Gas Sr.—Rolan Lynch. H-L Glider Sr.—Bob Vetter. Class A Gas Open—Vernard Guyer; B Gas Open—Robert Dunham; C Gas Open—Jas. Paysen; D Gas Open—Edw. Gale. H-L Glider Open—Darrell Miner. Rubber Power, Ages-Classes Combined—Carl Lindsey; T-L Glider, Ages-Classes Combined—Bob Vetter. CO2, Ages-Classes Combined—Geo. Brown, Jr.

*U-control winners.* Class A Speed Jr.—Bob Carnes; B Speed Jr.—Fritz Probst, Jr.; C Speed Jr.—Elwyn Hill; D Speed Jr.—Elwyn Hill. Stunt Jr.—Fritz Probst, Jr. Class A Speed Sr.—Robert Rowe; B Speed Sr.—Bill Boyd; C Speed Sr.—Bill Boyd; D Speed, Sr.—John Williams. Stunt Sr.—Bob Arnett. Class A Speed Open—John Corlett; B Speed Open—Hank Young; C Speed Open—V Hudson and F. Manley. Stunt Open—Lewis E. Woolard, D-Sleeve Speed Ages-Classes Combined—Everett Gray. Flying Scale Ages-Classes Combined—John Corlett. Jet Speed Ages-Classes Combined—Bob Hardesty.

### Maine

From the *Flying Maniacs'* "Tale-Spinner" we learn that Mike Buccigross of "Ye Olde Hobby Shoppe" is backing a new model club—*Lewiston Sky Devils.*

### Minnesota

44 model airplanes participated in the June 6 Fargo-Moorhead Squadron of Civil Air Patrol. Winners: Stunt—Bow Warming. Class A—Howard Robbie; B—Bill Selberg; C—Andy Brasted. Lt. Karl Ordring was director of the contest, which was staged on the Ewald Benedict farm 2-1/2 miles southeast of Moorhead.

### New York

The *Brooklyn Record Reckers* want it known that they want "boys who build, not ones who talk a good flight" to come to their September 19 contest, to be held just outside of Hicksville, L.I. For info write: Bernard Furgang, 680 E. 49 St., Brooklyn 3.

Walter Wagner, Jr., member of the *Westchester Aeronuts Club,* broke the speed record for Class C 116.5 mph at the N.Y. Mirror Meet.

Results of the June 20 controline contest held by the *Flying Bisons* and the *Buffalo Aeronuts:* Class A Speed Jr. & Sr. combined—Klabunde 85.68; Open—McCarthy 87.34. B Speed Jr. & Sr.—Parry 97.26; Open—Kirk 98.32. C Speed Jr. & Sr.—M. Jordan 113.16; Open—Petrevan 113.88. D Speed Jr. & Sr.—J. Nelson 102.23;

Open—Nixon 106.47, Stunt Jr. & Sr.—Chimera and Royal; Open—Wilson and Lawrence, Combined Flying Scale—J. Menig with a Curtis P 6-E.

### Oregon

Results of the recent U-control contest held by the *Salem Cloud Chasers*: Open Stunt—M. Morten; A Speed—E. Cayton; B Speed—H. Jensen; C Speed—D. Hudspeth. Sr. Stunt—N. Holland; A Speed—Hammond; B Speed—Hammond; C Speed—No Entries; D Speed—K. Gardner. Jr. Stunt—K. Gardner; A Speed—W Jensen; B, C and D Speeds—J. Hudspeth

### Pennsylvania

The *Pottstown Gas Model Club* (Strawbenders) will hold its third annual meet Sept. 19 at the Daniel Boone Homestead, 8 miles west of Pottstown. The meet will be sponsored by the local *Optimist Club*. Events will include: free flight A, B, C, D; free flight stunt; free flight beauty; rubber and towline glider. AMA sanctioned. For further info write Pres. Edward W. Jameson, 1018 Queen St., Pottstown.

"The Bulletin," in cooperation with Phila. Plymouth dealers, sponsored the Flying Circus. It was conducted by the Phila. Metropolitan Council of Model Aeronautics. Admission was free. The grand prize—a special certificate signed by Air Secretary W. Stuart Symington—went to Roger Barron, 13, of Springfield, Va., who captured the first prize in three events: Class B free flight Jr., Class C free flight Jr., and Class D free flight Jr. First prize in the beauty contest, determined by beauty of construction and workmanship, went to Frank Waskiewicz, 26, of 1720 Frankford Ave., Phila. A "double piggyback" entry owned by Emil Poljevka, 26, 2023 E. York St., Phila., won first prize in free flight stunt. The plane—or series of three planes—had a smaller plane, powered by a rubber band, strapped to its back. That plane, in turn, had a small glider strapped to it. The two smaller craft were released in the air.

Other winners: Class A free flight Jr.—Faye Peoples; Sr.—Bob Walters; Open—Pasquale Ciembrello. Class B free flight open—Richard A. Vickrey; Sr.—F. Tallowski. Class C free flight Sr.—H. Danick; Open—Richard R. Vickrey; Class D free flight open—Edwin F. Bates. Rubber combined classes—Robert W. Logan. Towline combined classes—William Hewton. In addition to the model planes, there were on display many full-sized planes including an Army Flying Boxcar and P-84 Thunderjet, a Navy Corsair and a number of commercial planes.

The *Exchange Club* formed a model airplane club in Newtown, so reads "The Prop Spinner News", and have received sanction for a meet on October 10. There will be $1000 worth of prizes. The Federation has pledged support.

### Washington

Results of *Seattle Guildliners University Model Club's* recent contest: Sr.—Chuck Riggs 1:27; Jr.—Ralph Brooks. All modelers interested are invited to join. For info write Pres. Ed Goldstein, 1006 1st Ave. South, Seattle 4.

### Wisconsin

Here are results of the 2nd Annual *Thermal Dusters'* contest June 20 at Beloit: Class A Speed—Dick Swenson 9642; B Speed——E. K. Waters 113.88; C Speed—Edwin P. Chessel 129.17; D Speed—Les Gerhardt 14748; Stunt — John Drouillard 253 points; Flying Scale—Andrew Zoph.


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**Ohlsson & Rice "19" or "23" Rotary Valve Glow Plug Engine**

Be your own "production line" by assembling the finest engine ever built from inspected parts identical with those which go into these great engines on the factory production lines. Engine Pak is a complete kit containing precision parts ready to assemble. May be converted to ordinary ignition by addition of a timer.

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| *McCoy 49 | 25.00 |
| *McCoy 29 | 19.50 |
| *O&R 60 | 11.95 |
| *O&R 23 | 9.95 |
| *O&R 19 | 9.95 |
| *O&R 23 Rotary Valve | 10.95 |
| *O&R 19 Rotary Valve | 10.95 |
| *Anderson Spitfire 60 | 24.95 |
| *Fox 59 | 29.95 |
| *Atwood Champion | 17.50 |
| *Cyclone 60 | 18.95 |
| *K&B Torpedo 29 | 18.50 |
| *K&B Torpedo 24 | 16.50 |
| *Dennymite 59 | 6.95 |
| Arden 099 PB | 12.50 |
| Arden 099 BB | 15.50 |

**Glow Plug Engines**

| | |
|---|---|
| *O&R 19 Rotary Valve | 9.95 |
| *O&R 23 Rotary Valve | 9.95 |
| *Mighty Midget 45 | 14.75 |
| *K&B Glo-Torp 29 | 14.95 |
| *K&B Glo-Torp 24 | 14.95 |
| *Sportsman Jr. 36 | 14.95 |
| *Sportsman Sr. 55 | 16.95 |
| *O&R 19 Rotary Valve G.P. Engine Pak | 8.95 |
| *O&R 23 Rotary Valve G.P. Engine Pak | 8.95 |

**Control-Line Kits**

| | |
|---|---|
| *Madman (C) | 10.00 |
| *Box Car Chief (C) | 5.95 |
| *Box Car (C) | 5.95 |
| *Casalaire (C) | 14.75 |
| Super-Zilch (C) | 4.95 |
| *Snafu Ercoupe (B-C) | 9.95 |
| *Snafu Typhoon (B-C) | 10.95 |
| *Skychief (B-C) | 6.95 |
| *Skeeter (B-C) | 3.95 |
| A.J. Fireball | 7.95 |
| Skybox Trainer (B-C) | 3.95 |
| Skybox Stunt (B-C) | 3.95 |
| *Invader—All Metal (B) | 7.95 |
| *Snafu Magician (B) | 3.95 |
| *Box Car Dinky (B) | 4.25 |
| *Box Car Dilly (B) | 4.95 |
| Dmeco Speedwagon (B) | 4.95 |
| Nifty (B) | 4.95 |
| Zing (B) | 4.95 |
| Trainee (B) | 3.95 |
| Stunt Ace (A-B-C) | 3.50 |
| Ryan Fireball (A-B-C) | 3.95 |
| Whippet (A-B-C) | 3.95 |
| Greyhound (A-B-C) | 3.95 |
| *Fairchild PT-19 (A-B) | 5.45 |
| Piper Cub (A-B) | 4.95 |
| Lil' Zilch (A-B) | 2.95 |
| Hawker Super Fury (A) | 2.50 |
| Whirlwind Jr. (A) | 2.95 |
| Super Solution (A) | 2.25 |
| Swee-Pea (A) | 2.50 |
| Winnie Mae (A) | 2.95 |

**Free Flight Kits**

| | |
|---|---|
| Mercury (C) | 5.50 |
| Power House (C) | 5.95 |
| Playboy Sr. (C) | 6.00 |
| Buccaneer Spl. (C) | 6.95 |
| Pacer (C) | 4.95 |
| Mercury Jr. (B) | 3.95 |
| Power House (B) | 4.95 |
| Playboy Jr. (B) | 3.25 |
| Buccaneer Spl. (B) | 3.95 |
| Aeronca Champ (B) | 4.95 |
| Honey B (B) | 4.95 |
| *Miss Tiny (A-B) | 3.65 |
| *Spook 48 (A-B) | 1.95 |
| American Ace "36" (A) | 1.50 |
| Pixie (A) | 1.95 |
| $CO_2$ Power House | 1.50 |

**Accessories**

| | |
|---|---|
| U-Reely Control | 7.50 |
| U-Reely Remote | 12.50 |
| *Wood Reel 6" Dia. | .50 |
| *Wood Control Handle | .50 |
| Metal Reel | 1.25 |
| Metal Control Handle | 1.25 |
| *2-50' Stranded Wire | 2.60 |
| *2-60' Stranded Wire | 2.90 |
| *2-70' Stranded Wire | 3.25 |
| *2-3' Lead Ins | .40 |
| Spark Plugs (all sizes) | .50 |
| Arden Glow Plug | .85 |
| *O&R Glow Plug ¼" x ⅜" | .85 |
| *McCoy Hot Point Plug | .85 |
| *Counter-Balance & 1-blade prop | 2.00 |
| *1-blade prop | .50 |
| *Firecracker Coil | 2.75 |
| *Smith Competitor Coil | 1.95 |
| Aero Quality Coil | 3.00 |
| Aero Ft. Wt. Coil | 2.50 |
| Aero Condenser | .35 |
| Metal Condenser | .30 |
| *Mart-Lee Muffler Class A&B | 2.95 |
| Class C&D | 3.75 |
| *Newell Booster Plug | .50 |
| Toggle Switch | .50 |
| Slide Switch | .25 |
| *Hillcrest Timer | 1.25 |
| *Austin Timer | 1.50 |
| Arden Timer | 1.85 |
| Arden Booster Jack | 1.25 |
| *Univ. Needle Valve | 1.00 |
| *Battery Box (Lg.Med.Sm.) | .40 |
| *Lucite 4-pencell Bat. Box | .75 |
| *Veco Bell Crank (Lg.Sm.) | .25 |
| *Maeco Stunt Tank | 1.25 |
| *Maeco Stooge | .35 |
| *Baker Wedge Tank (Lg.Med.Sm.) | 1.25 |
| *O&R 60 Tank | 1.75 |
| *O&R 19 & 23 Tank | 1.50 |
| *4-Way Plug Wrench | .50 |
| *Austin Glue Gun | .75 |
| *Formed Tail Skid (Lg.Sm.) | .25 |
| Ammeter (0-35) | 1.85 |
| "Hap" The Pilot | .95 |

**Tools**

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|---|---|
| Dremel Moto Tool | 23.50 |
| Dremel Moto Saw | 5.85 |
| DeLuxe Vibro Tool | 16.50 |
| Hobby Chest #86 | 10.00 |
| Hobby Chest #87 | 15.00 |
| Xacto Hand Drill | 2.75 |
| Xacto "C" Clamps (4) | 1.50 |
| *Ungar Soldering Kit | 2.00 |
| *Ungar Woodburning Kit | 2.00 |
| *Soft Jaw Hobby Vise 2" | 2.00 |

**Gas Powered Boat Kits**

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| O-Gee Hardware Kit | 4.95 |
| Harco Cruiser 25" | 4.95 |
| Chris Craft 26" | 4.95 |
| Chris Craft Express | 4.95 |
| Chris Craft Runabout | 4.95 |
| Owens Flagship 26" | 4.95 |
| "Sea Myth" Luxury Cabin Cruiser 36"x10" | 13.95 |
| "Buckeye" Speedboat (A-B) | 4.95 |

**Misc. Boat Kits**

| | |
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| Southern Belle 14" | 2.50 |
| Schooner Bluenose 22" | 3.50 |
| Sovereign of Seas 23" | 3.50 |
| Cutty Sark 24" | 3.50 |
| Tug Boat 14½" | 3.50 |
| Oil Tanker 20½" | 4.00 |
| Destroyer Preston 24" | 4.00 |
| Coast Guard Cutter Campbell | 4.00 |
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| USS Kearsage 32" | 8.50 |
| Marine—Santa Maria | 15.00 |
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| | |
|---|---|
| *S.F. Cable Car | 2.95 |
| *Horseless Carriage | 1.50 |
| *Surrey with Fringe on Top | 1.75 |
| *Covered Wagon | 3.95 |
| *Stage Coach | 3.95 |
| *Sportsman Convertible | 1.00 |
| *AV8 Hot Rod | 1.00 |
| *DeLuxe Midget Racer | 1.50 |
| 1900 Era Fire Truck | 4.00 |
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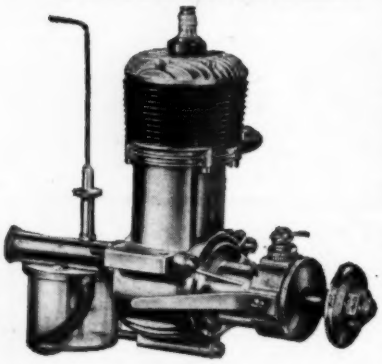

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## Boeing XL-15

(*Continued from page* 19)

sequence. The engine is a Lycoming air-cooled design developing 125 hp. and driving a conventional, two blade fixed-pitch wooden propeller. This entire powerplant can be removed in just 9 minutes and a new one installed in 21 minutes; yep, only half an hour for a complete engine change!

The pilot sits in the conventional position but he's surrounded on all sides by vision: forward, aft, all around the sides and straight up! In front of him on the instrument panel is a full complement of flight instruments including gyro indicators, radio compass and a new type flight altitude indicator. He has a complete two-way radio installation. The observer sits practically in "space;" he's located in a rear-facing position in a cupola of formed transparent panels that permit him to see in any direction including straight down! Both crew members are protected by armor plate which, in combination with self-sealing fuel tanks and other features, gives them protection comparable to that of a combat pilot in a swept-wing sonic fighter!

The XL-15 has a tricycle landing gear in reverse; and if you don't like it that way you can reverse it! Yes, believe it or not, the "nose" wheel of the XL-15 is located behind the main gear. These latter units may be installed on either side of the fuselage, i.e., with the wheels on the outside of the strut or inside of the strut, the object being to reduce the tread when required for stowage in a narrow space.

The tail is carried out in back of the gondola by a monocoque boom extending rearward from the upper aft corner. Twin vertical surfaces are carried but these project down from the horizontal stabilizer instead of up as on conventional twin-tail designs. Reason for this inverted arrangement is to bring fins and rudders down into the slipstream from the propeller. A little trick is used to accomplish this, however, in that the engine is given a substantial "downthrust" to throw the slipstream up towards the tail, a combination of design elements that solved an otherwise difficult problem.

But with all these features it still hasn't been explained how the XL-15 obtains its phenomenal slow-flying characteristics; and here again Boeing engineers used another little trick: full span aileron-flaps with spoiler-aileron panels. That's quite a mouthful, but here's how it works: a good, thick, cambered airfoil was used in the layout of the basic wing to provide high lift. The planform is a simple rectangle with parallel leading and trailing edges and square tips.

In going to work on the problem of flaps the designer soon comes up against his first big obstacle: their chord should not be greater than 25-30% of the main wing chord or they begin to display peculiar and inefficient qualities. When the designer is stopped in this chordwise direction, he immediately begins moving out in the spanwise direction in his ceaseless quest for more and more flap area. Designers, until recently, were stopped again: by the aileron! Thus, for all these years flaps have extended only about quarter-chord forward and out to the aileron laterally.

But with full span flaps, what is to be done for aileron control? Boeing engineers solved that one simply and effectively: they connected up these flaps differentially; that is, one goes up slightly

(*Turn to page* 45)

# The BIGGEST NEWS about PROPS that ever hit the Model Field

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| Dia. | Pitch |
|---|---|
| 7 | *6 **8—9—10½ |
| 8 | **6 —8—9—10½ |
| 9 | 6 —8—9—10½—12 |
| 10 | 6 —8—9—10½—12 |
| 11 | 6 —8—9—10½—12 |

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| Dia. | Pitch |
|---|---|
| 8 | *3½ **6—8—10 |
| 9 | 3½ —6—8—10—12 |
| 10 | 3½ —6—8—10—12 |
| 11 | 4 —6—8—10—12 |
| 12 | 5 —8 |
| 13 | 5½ |
| 14 | 6 |

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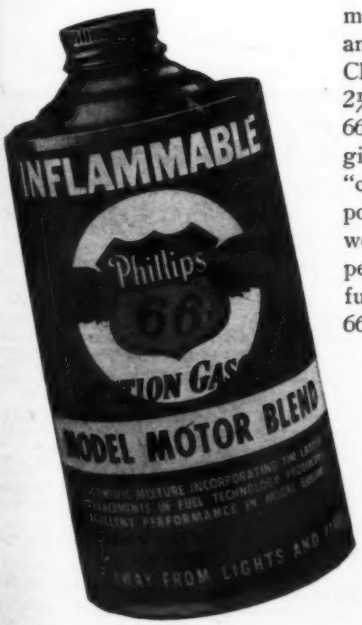


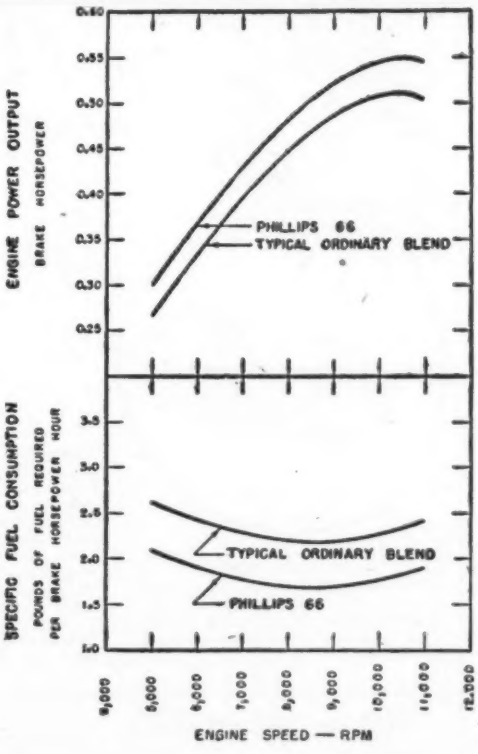


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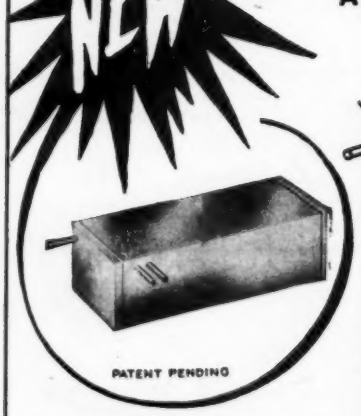

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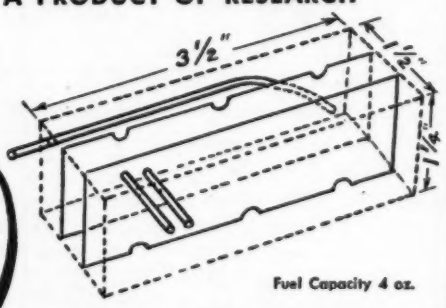


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*in Oct. issue MODEL AIRPLANE NEWS*

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About a

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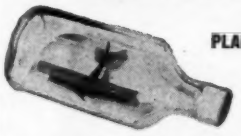

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This is an authentic model of the well-known "Jenny," (Curtiss JN-4D) that first saw combat in the Mexican War of 1914. It was later flown by the Allied pilots during World War I. A Jenny, one of the most reliable planes of the time, flew the first U.S. Airmail run from Washington, D.C., to New York City on May 15, 1918.

This kit provides you with all of the material AND the know-how to build a simplified copy of a history-making Jenny. NO, we do not cut the end off of the bottle, but we do show you how to insert it by a simple method anyone can use. The bottle is an easily obtainable flat type and is not included in the kit. This is a dust-proof mantelpiece model that will certainly invite comment from curious friends.

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Braun-Craft 1232 ETOWAH, DEPT. A9 ROYAL OAK, MICHIGAN

while the other goes down a great deal, and vice versa. Thus the XL-15 has the largest ailerons in proportion to wing area of any airplane ever built! But just when it might appear that the problem had been solved another one presented itself. Since an aileron is merely an airfoil in disguise, it is subject to the same stalling tendencies at angles of attack of 18-22 degrees, the range varying widely for different airfoils but this being a rough average for comparatively thick profiles. As these same surfaces are used as flaps, and since they extend down from 30° to 60° it is obvious that after they pass that 18-22 degree range they are completely stalled and no longer effective as ailerons but powerfully effective as flaps. This leaves the airplane without adequate lateral control, and so Boeing engineers installed a spoiler-aileron on the wing uppersurface slightly forward of the aileron-flap panel at the trailing edge. These spoiler panels are simply slightly curved plates that project up out of the wing at the movement of the control wheel.

The Boeing *Scout* is an Air Force airplane only in its procurement, for the AF alone has the authority, experience and special knowledge required for the purchase of a military airplane. It is the recently named Army Field Forces for whom the XL-15 was designed and with whom it will operate. Because of this, the value of its utility as an air-ground cooperating weapon can be more fully appreciated. The *Scout* is designed for operation in either tropical or arctic weather conditions, in temperatures ranging from 65° below zero to 160° above zero, wherever the AFF may be called. A special winterization kit supplies the necessary equipment for cold weather operation, and gasoline heaters maintain a cabin heat differential of 86°. It can operate effectively from water, and when equipped with Edo floats acn take off from smooth water in 760 ft., with choppy water reducing this run substantially. It can carry an auxiliary fuel tank to increase its endurance, and a JATO unit can be fitted for rapid takeoff from small ponds or lakes with less than 760 ft. length. These floats can be exchanged for skis to operate from snow. It can operate from a 500 ft. Brodie cable gear through a quickly-attached fitting above the wing.

Because of its slow hovering speed, the XL-15 can be used for truck convoy duty. It can take photographs at a slower speed than any other class military airplane. Its large gondola windows may be opened for the dropping of supplies, messages or special equipment. It can be completely disassembled and fitted in a standard Army 2 1/2 ton truck for overland travel.

This amazing airplane has a span of 40 ft., is 26 ft. long and 7 ft. 10 in. high. It weighs only 2090 lbs. fully loaded and can carry a 534.4 useful load. The XL-15 was first flown in July 1947 by Elton H. Rowley, Boeing-Wichita flight test chief. Demonstrated at Wright Field and AFF bases throughout the country, the design won such high praise that a service test order for ten XL-15 airplanes is now undergoing a rugged "shakedown" test under widely varied conditions.

No, they'll never forget the "grasshopper" of World War II, but it is equally certain we'll never again see standard commercial lightplanes engaged in the now highly specialized and skilled job of liaison with the ground forces. For that job, the AFF have chosen the Boeing XL-15 *Scout*, the "utility unlimited" of the military skies and a portent of what's to come in the personal aircraft future.


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1/64 ....4 for 10c | 5/32 ....3 for 10c
1/32 ....4 for 10c | 3/16 ....2 for 10c
1/20 ....4 for 10c | 1/4 ....2 for 10c
1/16 ....4 for 10c | 5/16 ....6c ea.
3/32 ....3 for 10c | 3/8 ....6c ea.
1/8 ....3 for 10c | 1/2 ....7c ea.

18" BALSA STRIPS
36" costs double. Sizes with * come in 60" too. Cost 5 times 18". Minimum order on 60"—$1.00.

1/16 sq.....20. 5c
1/16x1/2.....15. 5c
1/16x3/16 12. 5c
1/16x1/4.....10. 5c
1/16x3/8.....8. 5c
1/16x1/2.....6. 5c
3/32 sq.....12. 5c
3/32x3/16 10. 5c
3/32x1/4.....6. 5c
3/32x3/8.....5. 5c
3/32x1/2.....4. 5c
1/8x1/2*.....12. 5c
1/8x3/16* 10. 5c
1/8x3/8*.....8. 5c
1/8x3/8*.....5. 5c
1/8x1/2*.....4. 8c
1/8x1/2*.....3. 5c
5/32 sq.*.....5. 5c
3/16 sq.*.....5. 8c
3/16x1/4*.....4. 8c
3/16x3/8*.....3. 5c
1/4 sq.*.....3. 5c
1/4x3/8*.....4c ea.
1/4x1/2*.....5c ea.
1/4x3/4*.....6c ea.
1/4x1*.....7c ea.
5/16x3/8*.....7c ea.
5/16x1/2*.....8c ea.
3/8x1/2*.....8c ea.
3/8x1*.....9c ea.

18" BALSA PLANKS
36" Costs Double, 60", Four Times

1/16x1/4.....10 | 1x6.....55 | 2x6.....1.00
1x1.....10 | 2x2.....40 | 3x3.....80
1 1/2 sq.....15 | 2x3.....45 | 3x4.....1.25
1x2.....20 | 2x4.....60 | 3x6.....1.65
1x3.....25 | 4x4.....1.50 | 4x6.....2.25

6" x 36" BALSA

1/16"..40c | 3/16"..70c | 1/8".....90c
3/32"..50c | 1/4".....80c | 3/8".....95c
1/4".....60c | 3/8".....90c | 1/2".....1.00

NOSE BLOCKS

1x2x1 | 2x2x6 10c
3 for 5c | 2x2x8 15c
1x2x2 | 2x5x5 17c
2 for 5c | 2x6x6 25c
1x2x6 5c | 3x3x3 10c
1x3x3 4c | 3x3x6 19c
1x3x6 7c | 3x6x6 40c
2x2x2 3c | 4x4x4 27c
2x2x3 5c | 4x4x6 45c
2x3x3 7c | 4x6x6 60c

PROP BLOCKS

1 1/2x3/4x5 2c
1 1/2x2x8 15c
3/4x1x8 3c
3/4x1 1/4x10 3c
3/4x1 1/4x12 4c
1x1 1/2x12 7c
1x1 1/2x18 8c
1 1/2 sq.x16 15c
1 1/2x2x18 15c

36" TAPERED TRAIL. EDGES
Save Hours Carving Time

3/32x3/4.....5c | 3/16x3/4.....8c
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5/32x5/8.....7c | 1/4 or 5/16x1 10c
Also in 8 ft. at triple these prices.

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5"-- 4c | 5"-- 5c
6"--5c | 6-8-10"
7"--6c | 7c 35c 45c
8"--7c | 8c 35c 45c
9"--8c | 9c 40c 50c
10"--9c | 10c 45c 50c
11"--x | 45c 50c
12"--10c | 45c 50c
13"--12c | 50c 50c
14"--12c | 50c 50c
15"--15c | xx xx
16"--xx | 90c 90c
18"--1.00 | 1.00

PLASTIC

2 Blade 3bl 4bl
1 1/2"--2c 10c 10c
2"--2c X 15c
2 1/2"--3c 15c X
3"--5c 15c 20c
3 1/2"--10c 20c X
4"--15c 30c 30c
5"--20c 50c X

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CLEAR DOPE
THINNER.
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2 oz.. 20c

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## Design Forum

(*Continued from page 24*)

camber is 1/16 the chord. If the camber of this single surface wing is increased to 1/2" in 4" of chord, the lift for normal level flight angles will be *approximately* 100% greater at the same angle of attack. These figures result from imperical data derived from hundreds of actual flying tests.

Double surface wings are most often used on contest models, however, because they give more lift with less drag than the single surface one shown in Fig. 1. Fig. 2 shows the double surface wing, a Grant X9 section. The lift of the single surface wing ranges from 6 to 12 times its drag; with the double surface wing it ranges from 12 up to as high as 28. In other words, it gives two or three times as much lift as the single surface for the same amount of drag. Lift increase resulting from an increase in camber of this type wing is the same as for a single surface wing when the combination of upper and lower surface camber is considered.

For instance, if you wish to determine the relative lift of two sections as shown in Fig. 3, measure the height of the uppercamber and multiply by three. Add to it the undercamber value and divide by 4 times the chord. In formula form this is expressed: Lift (L) is proportional to $\frac{3H_u + H_L}{4C}$, where $H_u$ = maximum upper-camber height, $H_L$ maximum lower-camber height, and C = chord length, *all in inches*. This expression is called the camber factor and is the *approximate* measure of lift of a section at about 3° angle of attack. For instance, Fig. 3 shows two sections with the same uppercamber, but (B) has a zero or flat lowerchamber. The upperchamber of both is .4 inches. The chamber factor of

$$A = \frac{[3(.4)+(.2)]}{4(4)} = \frac{1.4}{16} = 0.0875;$$

when chord C = 4 in.

$$B = \frac{3(.4)+0}{4C} = \frac{1.2}{16} = 0.075.$$

So B gives only 6/7 as much lift as A, at equal speeds. However, B causes less drag and absorbs much less power.

The problem in designing your contest wing section demands that you have high lift but low drag. To obtain high lift this section should therefore have a high camber. Usually the uppercamber is about 1/8 the chord. To reduce the drag, this uppersurface is shaped carefully to conform with a parabola with maximum camber at a point 1/3 of the total chord back of the leading edge as in Fig. 2. It is quite a tricky problem to obtain low drag and at the same time the high lift that produces low sinking velocity.

Low drag results in most cases from a comparatively flat or slightly negative cambered *undersurface*. The answer to this lies in the important fact that most of the drag of a positively curved single surface wing occurs beneath and immediately back of the leading edge, represented by a dark cross-hatched section in Fig. 4A. This drag results from the airflow sweeping back under the leading edge and not following the abrupt upward sweep of the undersurface. This causes a rarification or low pressure area immediately behind the leading edge beneath the undersurface, which may be corrected by using what is called a Phillips Entry.

(*Turn to page 48*)

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| Ohlsson 19 | 10.95 |

**Class B**

| | |
|---|---|
| Forster 29 | $14.85 |
| McCoy 29 | 19.50 |
| Mohawk Chief | 8.95 |
| Ohlsson 23 | 10.95 |
| OK Super 29 | 16.50 |
| Sportsman Jr. | 14.95 |
| Torpedo 29 | 18.50 |

**Class C**

| | |
|---|---|
| Atwood 60 | $17.50 |
| Contestor 60 | 18.50 |
| Forster 99 | 24.50 |
| Fox 59 | 29.95 |
| Hornet 60 | 22.50 |
| McCoy 49 | 25.00 |
| McCoy 60 | 27.50 |
| Ohlsson 60 | 11.95 |
| OK Super 60 | 18.00 |
| OK Twin | 55.00 |
| Pacemaker 59 | 12.50 |
| Sportsman Sr. | 16.95 |
| Super Cyclone | 18.95 |
| Super Cyclone Dual Ignition | 19.95 |

**DIESEL ENGINES**

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|---|---|
| Deezil "A" Kit | $ 5.00 |
| Deezil "A" | 12.95 |
| Micro "A" | 18.50 |
| Movo "A" | 14.95 |
| Aero "B" | 16.50 |
| Drone "B" | 14.95 |

**JET ENGINES**

| | |
|---|---|
| Dyna-Jet | $24.50 |
| Dyna-Jet Red Head | 35.00 |
| Minijet | 35.00 |

**CO2 ENGINES**

| | |
|---|---|
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| Campus CO2 | 9.95 |

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|---|---|
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| Stunt Ace | 3.50 |
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| Miss Liquid Dynamite | 1.95 |
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| Perky A | 2.00 |
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| The Bat | 2.95 |
| The Bug | 1.50 |
| A. J. Fireball | 7.95 |
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| Circle King | 1.00 |
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| Piper Cub Coupe | 1.95 |

**Class B**

| | |
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| Brigadier 58 | 2.95 |
| Buccaneer Spec | 3.95 |
| Playboy Junior | 3.25 |
| Zipper | 5.95 |
| Humdinger | 3.95 |
| Westerner B | 4.50 |
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**Class C**

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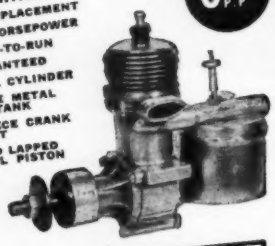

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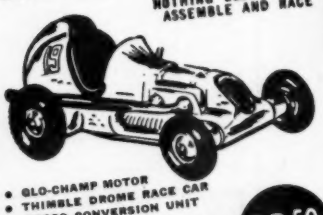

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This results from slightly curving the undersurface down immediately back of the leading edge as in Fig. 4B, then gracefully curving the undersurface up. In this way the airflow under the lower surface is smooth, resulting in low drag and at the same time providing lift due to the upwardly curved undersurface back of the Phillips Entry. If you examine a bird's wing you will note that its undersurface is similar to that in Fig. 4B. This type wing has brought home many world's records because it has both the characteristics for high lift and low drag.

Another problem in wing section design is *movement of the center of pressure* (CP). On most curved sections the CP on the wing, or the center of lift, moves forward and backward with changes in the wing angle of attack. This would be very desirable if its movement stabilized the aircraft. Actually it is an unstable movement. When a cambered wing noses up, increasing its attack angle, the CP moves forward. This tends to further increase the upward inclination of the wing and to produce a stalling effect, Fig. 5. With such wings considerable stabilizer area must be provided to overcome this unstable effect. It *too little* stabilizer area is used the airplane will be erratic in flight and hard to adjust. Valuable power is required to restore equilibrium. Large stabilizer means greater drag and weight, which in turn decreases duration. So, if means can be found to reduce the CP movement, less stabilizer area can be used, resulting in increased efficiency.

Many wing sections give little or no CP movement. However, these sections usually are poor for duration because they have little undercamber and a high sinking velocity. To gain one characteristic without losing the other is your problem, and it is not easy. To completely suppress the CP movement is usually unnecessary, and other important characteristics have to be sacrificed. However, its movement may be reduced to a large extent by providing the *undersurface* curve with a slightly upward curve just forward of the trailing edge, as in Fig 2. This has the effect of causing an increase in lift near the trailing edge *when the attack angle increases* (in other words when the wing noses upward) and thus tends to move the CP back with increase in angle.

During the past 15 years the Grant X9 wing section shown in Fig 2 has won many records because it provides a high lift with a low drag and the CP movement is comparatively slight. Wind tunnel tests made in Germany before the war by a well known model scientist, Hans Pfiel, showed this section to have a lift drag ratio of 28. Unfortunately the data, including records and graphs, were destroyed during the war so we are unable to give them to you now. The practical flying results of this section, however, show it to be excellent for duration, particularly when the wing chord ranges from 8" to 16", and the gliding speed is between 15 and 25 mph. Other full scale sections might show better results at higher speeds and with greater chord, but poorer results with smaller chord values and at lower speed.

Another excellent section was developed by Goldberg and has been used on many winning contest models. This has no Phillips Entry but has considerable undercamber which results in lower sinking velocity than the Grant X8, but in greater drag at high speeds during the climb for instance.

Sometimes a model designer wishes to use a particular wing section or design,


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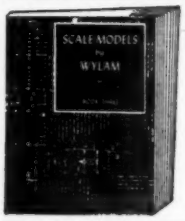


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one with a definite lift value. Usually he has no data on known sections and no means of testing those he may create himself. Thus he is forced to do a lot of guessing. By means of the following formula, however, the *approximate* lift of any section at attack angles below 10 can be determined. This does not give absolutely accurate values for all cases, but it gives more accurate results than plain guessing. It will prove more accurate than you believe possible.

$$L = 0.002\ (C_F)\ AV^2 \left(\frac{I + 50C_F}{3 + 50C_F}\right)$$

L = Lift in ounces (or weight of airplane)

$C_F$ = Camber factor, $= \left(\frac{3H_u + H_L}{4C}\right)$ values previously given.

A = Wing area in square inches (for biplanes multiply by .8).

V = Minimum level flying speed in miles per hour; (at I angle of attack.

I = Wing angle of incidence (angle relative to propeller shaft axis).

To solve the formula, insert the numerical values of the various letters, calculating the value of $C_F$ from the formula given here in terms of the camber heights and wing chord.

Try this formula on some of your models, inserting the model weight for L, and solve for its speed V or vice versa.

We hope this discussion answers a number of the questions asked by Val Rich of Montpelier, Idaho, in a recent letter.

* *

Robert Smith of Tyron, Ga., asks us to explain the action of wing slots. A wing section with a typical slot is shown in Fig. 6. Slots similar to this are used on many full scale aircraft to reduce stalling at wingtips. Their action is simple. When the air passes over the wing *uppersurface* during flight, it undergoes a *slowing down process* from leading to trailing edges. In other words, it gradually gives up its dynamic energy as it passes over the uppersurface. This loss of energy by the air is translated into lift. When the wing angle attack is large, considerable lift is developed and the airflow over the upper surface gives up its energy quickly and more completely. Often the loss of energy and the resulting drop in air velocity reaches a critical point before the flow reaches the trailing edge. In such case the air loses its flow characteristics and begins to tumble arbitrarily. When this occurs, lift drops to zero at points of turbulence.

In other words to obtain lift throughout the full length of the wing chord, the air must flow smoothly without turbulence. This is where slots come in. Their proper use tends to reduce this turbulence and keep the air flowing smoothly over the entire surface. Actually the slots eject high speed air, with *added dynamic energy*, into the slowing down airflow over the uppersurface. This added flow carries along the de-energized air, giving it new energy and preventing turbulence from occurring. In this way wings may assume high angles of attack without having the air over the uppersurface become turbulent, with the usual stalling result.

Slots are used at the wingtips rather than inboard because stalling at the tips is dangerous and often results in lack of control and spinning of the airplane. Usually if the airflow is kept smooth over the wingtips an airplane will not spin.


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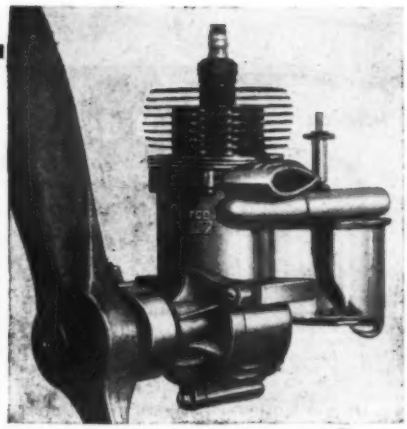

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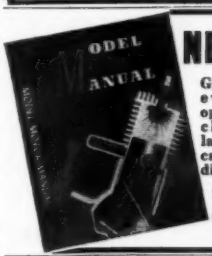


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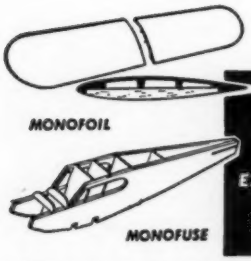


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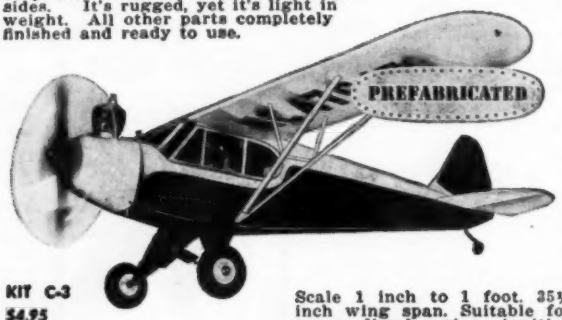


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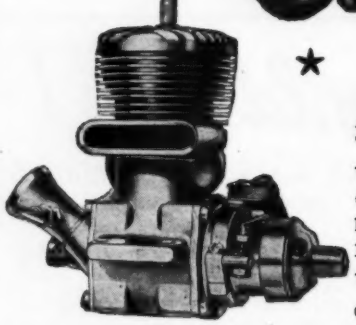
BY
**DOOLING**
*FAMOUS*
*DOOLING "61"*

Finest and most powerful 0.60 cu. in. engine built. For cars, planes, boats. Ball bearing crankshaft—roller bearing conn. rod.

The "Wraps" are off the
**ARROW** RACE CAR



World's Record-holding Prototype Race Car: 123.98 MPH, official AMRCA record held by Joe Grijalva, Los Angeles, Calif. DOOLING "61" and the ARROW make a winning team!

Car furnished complete with fuel tank, coil mount, battery case, switch and bridle —less engine.

*New Records with the "61"*
Proto Race Car—AMRCA Official Joe Grijalva, Los Angeles, 123.98.

Spur Gear Car—IMRCA Official: Stew Aleshire, Los Angeles, Calif., 128.93 MPH.

**DOOLING BROTHERS**
**5452 WEST ADAMS BLVD.**
**LOS ANGELES 16, CALIF.**


From this standpoint slots have little use on a model, because throughout the flight wings assume angles usually not greater than 8°. Slots are most valuable at angles of 13° or up where stalling is the consideration. However, slots do help to some extent on models from another standpoint. They increase the lift on the wing slightly. With any given amount of wing surface greater lift is developed. This is one way of increasing the lift while at the same time keeping the wing area within contest requirements when a wing area rule is used. Now, however, the National Rules impose no wing area restrictions so slots are merely an added luxury unless you wish to obtain added lift with smaller wing area and less structure.

They have another advantage; they reduce the CP movement. On a number of models using slots, it was indicated that less tail area could be used without loss of stability, or the same tail area could be used with a shorter tail moment arm. This naturally results in a shorter fuselage and therefore in less weight and drag.

Slots are uselss, however, unless they are *constructed properly*. Their shape and position are important. Excellent results have been obtained when they are located 1/3 of the wing chord back from the leading edge. Their contours never should be made perfectly straight like *slits* in a wing but should be carefully curved as shown in Fig. 6. The width of the outlet at the uppersurface should not be more than 1/2 the width of the opening at the undersurface. In other words, the undersurface opening should be two or three times as wide as the outlet, because the whole idea is to increase the air velocity over the uppersurface. The ejected airstream velocity can be greater only when the lower opening is large and the upper one small.

Mr. Smith also wishes to know what is wing loading and power loading. Wing loading is the amount of weight carried per unit of wing area. If the airplane weighs 100 oz. and has 10 sq. ft. of wing area, the wing loading is 10 oz. per sq. ft. Power loading is the total amount of airplane weight per unit of power employed. If the airplane weighs 100 oz. and the motor develops ½ hp, the power loading is 200 oz. per hp. Sometimes horsepower is expressed in cubic inches of piston displacement. If the engine has 1 cu. in. displacement, our airplane then will have a power load of 100 oz. per cu. in.

## Hi-Lo

(*Continued from page 27*)

Test the model by gliding. The center of gravity of the original model is marked, but individual models will differ in most cases. Stalls and dives are easily corrected by moving the wing backward or forward respectively. When properly adjusted your model will R.O.G. with ease either as a high or low wing model.

Here is an excellent chance to observe performance with the two most common wing positions with the same model. You will get many flights out of *Hi-Lo* for it is rugged and well designed. The original model shown in the photo had over 70 flights to its credit when the pictures were made, and the only damage was a slightly chipped propeller which, incidentally, also shows in the illustrations. Go to it and *Happy Landings* with *Hi-Lo!*

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**Bill Atwood, the man who has given you the BABY CYCLONE, the TORPEDO, the BULLET and the CHAMPION engines, now announces (what you have been waiting for):**

**THE BRAND NEW–**

## "TRIUMPH '49"

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**ATWOOD MANUFACTURING CO., 147 Pasadena Ave., So. Pasadena, Calif.**


## Wakefield in '48

(*Continued from page* 17)

the order of the day. Gordon's ship was lost on its first flight of 7 min. and 30 sec. Thus his winning time was scored as 2' - 30", one-third of the total.

By '36 the Lord Wakefield International Trophy had come into its own as the real number one event of all modeldom. Our English friends recognized the fact that the only way to make a positive bid for the cup was to have each model flown by the man who knew it best, its builder. Accordingly, a national drive was made to raise funds for sending a full team to the American Nationals at Detroit. Elimination contests were conducted on the largest scale ever attempted in the British Isles. Consequently, the 6 man team that got off the boat in New York was the real cream of England's experts. And their efforts paid off; the "old pot" went abroad again.

A. A. Judge did the honors with an average of 4 min. 10 sec.

France was also represented in person that year by Andre Vincre of Paris. The New Zealand boys shipped in six models for the contest. Canada, of course, had its team present. The highlight of the meet was the royal treatment of the foreign visitors in a week of real fellowship transcending all differences of national background.

The ball was really rolling now and the competition hit a new high at the 1937 meet in England. Eight nations—England, France, Belgium, Germany, Norway, Sweden, Holland and the U.S.—had teams present. Three more—South Africa, Canada and New Zealand—were represented by proxy. 45 contestants in all were on the field, plus 11 proxy fliers. The American and Canadian teams had been chosen by the Moffet eliminations at our Nationals. Four of our boys made the trip with the help of home town civic groups. The Englishmen fairly outdid themselves in entertaining their guests, and that particular feature of the meet will live forever in the memories of the participants.

It remained for Emanuel Fillon to score France's first win in the Wakefield: 4 min. 13 sec. did the trick. The best our boys could net was a 10th place by Alvie Dague of Tulsa, Okla. Incidentally, the minimum allowable model weight had been increased to 8 oz. by this time.

It was at Guyancourt Airport near Paris that France rolled out the welcome mat in a fashion that was fast becoming a part of the Wakefield tradition. Once again participation in the contest was in itself a reward *par excellance*. 14 countries were represented in 1938, an all-time high.

This time our Yankees put on the heat for sure. James Cahill of Indianapolis hooked onto a thermal on his third flight, riding it for 33 min. 54 sec. Although that was his only good flight, it was enough to win, even when averaged down to 10' - 54".

So Jim joined the Wakefield hall of fame and brought the trophy back where we like to see it.

Undoubtedly many of you remember the 1939 meet. You will recall that the event had by that time assumed too much importance to be held merely as a part of the Nationals. It was held at Bendix Golf Course, in conjunction with the N.Y. World's Fair. Bernarr McFadden, publisher and patron of the aeromodeling hobby, assumed all expenses of conduct-


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**4¼ lb. Static Thrust Equal to 2 Hp. Plus.**
*Exerted at 125 mph. with 70% "Prop" efficiency!*

**152.4 MPH** by Temte and Thor, April 11, U. of Minn. Field House, indoors, necessitating 60 ft. lines.

**140.54 MPH** FIRST OFFICIAL AMA JET RECORD, set by Brad Thomas, High Point, N. C., May 2, 1948.

**FASTEST FLIGHT** of the great majority of 1948 AMA contests made by DYNA-JET Pilots, not "Experts."

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*ask the man who owns one!*
**No Ignition System**
*to burden your model!*
**No Propellers to Break!**
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*runs best on straight gasoline!*
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*Gives peak power as delivered from the factory*

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**The BEST ENGINE and the LEAST EXPENSIVE**
***It Will Not Wear Out!***
Runs as well 5 years from now as it does today. You save on engine life, trade-in value, and propellers! **Your best and most economical buy.**

**$35.00** If dealer can't supply, order direct. Prompt Delivery.

MAX. DIAM. ....2½"
LENGTH .....21½"
WEIGHT .....16 oz.
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**GUARANTEED**

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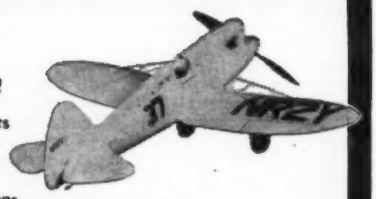

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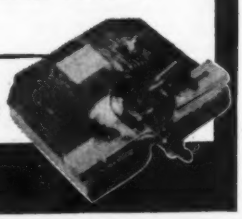

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ing the contest and entertaining the guests. In addition, he posted a cash prize of $250 for the winning team.

We selected 4 of our team members at the Nationals eliminations and one at a West Coast elimination, reserving 6th place for our defending champion. England once again sent over a full team and Canada did likewise. France and So. Africa had full proxy representation.

The old thermal wizard Dick Korda, of Cleveland, showed his superiority at that sort of thing by catching one for 43 min. 10 sec. on his first flight. Since no one else could even touch his 15' - 50" average, Korda became the last modeler to gain possession of the much sought Wakefield Trophy. For in a matter of weeks Hitler's armies marched into Poland, touching off the conflict that put an end to international competition on a friendly basis.

But now we are at it again! The American eliminations will be under way or completed even as you read this. Great Britain has already selected her best in a nation-wide elimination and is making every effort to have them here in person. Canada too can be counted on for a full team. Who else will be present at Akron it is hard to say under present conditions. But models are expected from boys down under in New Zealand, Australia, and So. Africa. The Akron and Cleveland women's chapters of the N.A.A. are cooperatively busy with arrangements for the royal welcome and entertainment of the participants. A.M.A. officials are preparing the contest machinery so vital to a well run event. Even the F.A.I., governing body of international aviation records, will be represented by members who will attend its convention at Cleveland the following week. In other words, the stage is being set for the crowning of the 11th Wakefield champion.

In all the years of Wakefield competition one fact has been evident: the contest has never been decided by luck. In every case the winner has been a proven champion, one who reached the top the hard way in his country. Beyond question this is a battle of experts. And when the smoke clears away on August 27 the number one expert of today will be in possession of the Trophy. Whatever his nationality, we shall take off our hats to him for his personal ability, and be happy to know that no one nation holds a corner on individual skill in the art of building and flying model aircraft. Furthermore, it will have been a thrill to have witnessed the resumption of a rivalry whose very essence is a spirit of good will, a project in international relations that could teach the U.N. the rudiments of a peaceful world.

## Wee Waco

(*Continued from page* 31)

of fuselage sides as shown on plan about 1/3 of length forward from the tail. This is only for handling strength. 4. Glue formers B, C and D in place on one fuselage side. 5. Glue opposite fuselage side in place on formers B, C and D. Make sure formers dry at right angles to fuselage sides.

6. Glue fuselage sides together at tail; sight along fuselage to assure uniform curving on both sides from former D back to tail. Allow to dry well. 7. Glue former A in place. Steam the balsa extension flaps shown on fuselage sides just aft of former A so they curve down and meet at top center of former A, making a cowl extension which lies under

the windshield. Trim off any excess which may overlap. 8. Cover the top of fuselage (now formed with two sides and formers in place) with 1/32" sheet balsa, grain running crosswise. 9. Cover bottom of fuselage from former D aft to tail with 1/32" sheet balsa, grain running crosswise of fuselage. 10. Form landing gear wire and glue to former B in position shown on plan. 11. Glue engine mount block in place on former A. Note installation detail drawing. 12. Tie tank to tank bed firmly with strong thread and reinforce with glue. Make cutout in tank bed to accommodate the loading hole.

13. Glue tank bed and tank in place, front end butt jointed to former B, and tank bed and tank fitting in cutout on former C. Curl tubing lead from tank to engine as necessary to keep inside fuselage, finally leading through bottom of former A to engine mounted on block as shown in installation detail drawing. 14. Cover bottom of fuselage forward of former D with 1/32" sheet balsa, with the grain running lengthwise of the fuselage. This facilitates curving the balsa to fit the bottom of former A and B. 15. Complete landing gear detail by gluing 1/32" balsa fairing to wire, then bracing with the bamboo. Note photos for detail. 16. Bend tailwheel wire, glue to bottom of fuselage as shown. 17. Add windshield and windows, cut to fit from the cellulose acetate sheet. 18. Add wheels and 1-1/2" aluminum cowl (fitted to former A) and fuselage is done. Wheelpants can be added for dress, if desired.

### WINGS

1. Cut wings from 1/16" sheet balsa; sand to 1/20" thickness. 2. Carve wing root fillet from 3/16" square balsa to airfoil curve fitting top of fuselage as shown on plan. 3. Glue wings to wing root fillet, thus establishing airfoil shape at the root; let dry thoroughly.

4. To establish airfoil curve all along the wings, steam the sheet balsa and bend carefully so that airfoil curve is formed all the way to tips. It will tend to slowly return to a flat surface. To make airfoil curve permanent, dope wings with clear dope, sand lightly and dope again. Repeat steaming process and make sure wing cools completely in airfoil shape. Now sand very lightly and dope again. Give a final steaming and forming, cooling thoroughly to airfoil shape. This step is important if you want topflight performance. Guard against washin or washout while wings are cooling after steaming by sighting along the leading and trailing edges and keeping them absolutely parallel.

5. Streamline wingroot fillet by shaping as shown in front view on plans. 6. Make interplane N struts as shown.

### TAIL SURFACES

1. Cut tail surfaces from 1/16" sheet; sand to 1/20". 2. Dope and sand lightly twice, then give a final coat of clear dope.

### PROPELLER

Refer to previous articles in MODEL AIRPLANE NEWS which tell in detail how to carve a propeller. The blank from which this prop is carved will give you a 1-7/8" pitch, if the hub and sides are cut away to the indicated lines, and the blades carved to fit.

### ASSEMBLY

1. Before final assembly, sand and dope the fuselage and stripe to suit your taste; keep colored dope use to a minimum to save weight. 2. Cut away balsa covering


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Lancer $CO_2$, $1.50; Megow $CO_2$ Spec.. 1.50
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| Aero Coil, Lt. Wt... Quality | 2.50 3.00 | 030, 3c; 035 & 040, 4c; 1/16, 5c; 3/32, 10c & 1/8, 15c. | |
| Aero Metal Cond. | 0.35 | | |
| Toggle Switch | 0.50 | Austin 4-way wrench | 50c |
| Slide Switch | 0.30 | Arden GlowPlug | 85c |
| Pee Wee Clips, ea. | 10c | Control Wire, 100' .. 010, 012, 014 and 016, 140' | 65c 75c |
| Spark plugs, state size | 50c | | |
| Austin Timer | 1.50 | Veco Air Wheels, per pair 2½" 2.15, 3½" 2.50 4½" 2.75 | |
| Battery Box, Lg., Med. or Sm. | 0.40 | | |
| Mounting Bolts ..... | 4/10c | Sponge Wheels, Alum. Hubs, ⅞" per pr. 20c; 1⅜" pr. 30c; 1⅞" pr. 50c; 2⅜" pr. 60c. | |
| Flexible Needle Valve | 1.25 | | |
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| Music Wire, 3 Ft... 020 & | | | |
| Plywood Sheets, 1/16, 3/32, ⅛, 3/16, ¼, 6"x 12" ..... 35c | | Alum. Tubing, ¼" O. D., 1/16 O. D., 3/32 O. D., Ft. ..... | 15c |
| Ball Bearing, Sm. or Lg. ..... | 10c | Testors Carved Balsa Props, 12", 14" & 16" dia. ..... | 75c |
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| STRIPS | | 3/16x5/8 .... 6c | | SHEETS | |
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| 1/16x1/8 .... | 1c | 1/4x3/8 ..... | 4c | 1/32x2 ..... | 8c |
| 1/16x3/16 .. | 1½c | 1/4x1/2 ..... | 6c | 1/20x2 ..... | 8c |
| 1/16x1/4 .... | 2c | 1/4x5/8 ..... | 7c | 1/16x2 ..... | 8c |
| 1/16x3/8 .... | 2½c | 1/4x3/4 ..... | 8c | 3/32x2 ..... | 10c |
| 1/16x1/2 .... | 3c | 5/16 sq. ..... | 5c | 1/8x2 ..... | 10c |
| 3/32 sq. 3 for | 4c | 3/8 sq. ..... | 6c | 5/32x2 ..... | 12c |
| 3/32x3/16 | 2c | 3/8x1/2 ..... | 8c | 3/16x2 ..... | 14c |
| 3/32x1/4 .... | 2½c | 1/2 sq. ..... | 9c | 1/4x2 ..... | 16c |
| 3/32x3/8 .... | 3c | 3/4 sq. ..... | 15c | 5/16x2 ..... | 18c |
| 3/32x1/2 .... | 3½c | PLANKS | | 3/8x2 ..... | 20c |
| 1/8 sq. 3 for | 5c | 1x3 ..... | $ .50 | 1/2x2 ..... | 22c |
| 1/8x1/4 .... | 2½c | 1x6 ..... | .90 | 1/32x3 ..... | 10c |
| 1/8x3/8 .... | 3½c | 2x2 ..... | .60 | 1/16x3 ..... | 12c |
| 1/8x1/2 .... | 4c | 2x4 ..... | 1.20 | 3/32x3 ..... | 15c |
| 5/32 sq. .... | 1½c | 2x6 ..... | 1.80 | 1/8x3 ..... | 19c |
| 3/16 sq. .... | 2c | 3x3 ..... | 1.50 | 3/16x3 ..... | 22c |
| 3/16x1/4 .... | 3c | 3x6 ..... | 2.70 | 1/4x3 ..... | 25c |
| 3/16x3/8 .... | 4c | 4x4 ..... | 2.50 | 3/8x3 ..... | 30c |
| 3/16x1/2 .... | 5c | 4x6 ..... | 3.70 | 1/2x3 ..... | 35c |

**Beveled balsa trailing edges, 36" lengths**

| | | | | | |
|---|---|---|---|---|---|
| 3/32x3/8 ..... | 3c | 5/32x5/8 ..... | 5c | 7/32x3/8 ..... | 7c |
| 1/8x1/2 ..... | 4c | 3/16x3/4 ..... | 6c | 1/4x1 ..... | 8c |

**Propeller Blocks**

| | | | | | |
|---|---|---|---|---|---|
| 8x7/8x1-3/16.. | 6c | 1-3/4 ..... | 18c | 18x1-3/4x2 .... | 32c |
| 10x1x1-1/2 .... | 10c | Glider Wing Section | | 9x1-1/2x2 .... | 15c |
| 12x1x1-1/2 .... | 12c | | | 10x2x2-1/4 .... | 25c |
| 14x1-3/16x | | 16x1-1/2x2 .... | 26c | 3x3/16x20 .... | 18c |

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on top of fuselage where horizontal tail surface fits so that leading edge of stabilizer is flush with top of fuselage. Glue horizontal tail surface in place. 3. Glue vertical fin in place. 4. Make sure wing root fillets fit flush against the fuselage with the dihedral as shown in the half scale front view, then glue top wings in place and allow to dry. Watch carefully that uneven glue shrinkage doesn't pull wings out of line, and be sure to sight from nose of fuselage to see that both wings have the same incidence. This is very important.

5. Glue lower wings in place. 6. Glue interplane struts in place. Make any minor variations in length which may be required to assure flush joints at strut ends where glued to wings. 7. Add wheelpants for display and G-line flying. Remove for free flight. 8. Install prop, and your *Wee Waco* is ready for flight testing.

If you have used your glue carefully, sanded the surfaces to the right size, and selected lightweight balsa, the entire model should weigh in at 1-1/8 oz. At this weight the *A-100* will give it plenty of zip and performance. If you went over a bit the performance will suffer, but even at 1-1/4 oz. you'll do all right as long as your engine is putting out full power.

### BALANCING AND FLIGHT TESTING

The model should balance about 40% back from leading edge of the upper wing. The location of the tank bed as shown should just about accomplish this balance, but if necessary it can be moved forward or back.

After you get the balance established, test glide the model. Look for a vacant lot where the grass is 5" or 6" high—this will make hard landings easy on the nose and save you a lot of unnecessary repair work. Launch the model in a gliding attitude and as close to its normal gliding speed as you can judge. A couple of trials will be enough to determine whether you are throwing it too hard or too easy. Now watch the behavior closely; if it goes into a steep glide, warp the elevators up slightly by breathing on them and carefully bending so as to avoid cracking the wood. If the glide flattens out, then the nose comes up and dips down, and this continues until it hits the ground, warp the elevators down slightly.

Very slight changes in elevator setting will have a marked effect on the flight characteristics. If you have balanced the model correctly, these slight changes in elevator angle should make it possible for you to get the right setting. At the right setting, if you launch the model in a gliding attitude and approximately at normal gliding speed, it should go into a steady and surprisingly flat glide and continue until it lands. Also, after you achieve this glide you need have no fear of gliding it on hard surfaces. The landing gear has purposely been set forward from the scale position; not enough to notice, but enough to make it land without nosing over every time.

Another adjustment which may be required has to do with the wings. If the model glides without diving or stalling, but turns with increasing sharpness to left or right, check alignment of the rudder and be sure it is straight. If so, then the reason for the turning lies in the wings which may have uneven curvature, or you may have made an error in gluing the wing root fillets so that one wing has more incidence than the other. You were cautioned about this during construction, but if you did miss the alignment cut one wing root fillet carefully away and align it with the other. Be sure when you do this that you keep proper incidence on the one that you don't cut off, and make the other one conform.


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For best flights, the desired glide is one in which the airplane makes a very wide circle to the left, or else glides straight ahead. The wide circle is preferable because the straight glide can carry the model too far for convenient flying.

After you complete the glide tests and have the desired glide, from then on *do not change the settings of the wings or elevators.* Just check regularly to make sure they stay in line.

Next comes the power tests—and here is the simple secret of free flight. Establish the desired glide, then apply power. If the airplane does not act properly, leave the wing and tail settings alone, and change the thrust line of the engine. This is very simple with *Wee Waco* because you can shave off the front end of the engine mounting block as required; and if you shave off too much, glue an extra piece on and start over.

Now let's investigate some common power-on tendencies. For instance, the model noses up sharply under power. This is overcome by "downthrust." The amount shown on the plans is what the original required.

If the model dives in under power, too much downthrust is present.

If the torque of the prop puts the model in a tight left turn, give it a little right thrust. You might have to add some downthrust at the same time. This is the same as taking off the back pressure on the elevators when you come out of a turn in a big plane.

If the model turns to the right under power, change the thrust line to the left.

There is a great deal of effect from just small changes in the thrust line, but if you start off with downthrust as shown on the plans, and with the thrust line straight forward and not to left or right, you will eliminate a lot of tiring adjustments. The downthrust will keep it from stalling under power, and the torque will make the model turn to the left. The main thing to remember is to get a good glide and then alter the thrust line until you get a nice climbing turn to the left with power on. The *Campus A-100* drops off in power as the pressure decreases, and *Wee Waco* will climb steadily to the left, level off and go into a steady glide after the power is run down.

When hand launching with power on, be sure to launch with the wings banked just as they will be when flying free. If you launch it level and straight ahead it takes a short time for the torque to pull it into the turn; meanwhile it will nose up, and thereafter it will take some time for it to assume its regular flying position—maybe too long. Also, launch it at flying speed.

A little care in construction, a thorough glide testing and power alignment, and a nice running *A-100* will give you a real thrill as the *Wee Waco* takes the air. The original is still going strong, with the best flight time clocked to date 1 min. 8 sec. It's not a contest job but a real flying scale model that you will be proud to fly and just as proud to have on your mantel. And with G-line control, it will be the hit of your club meetings.

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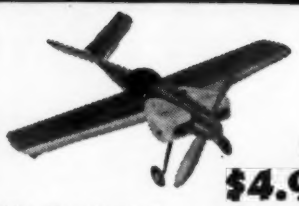

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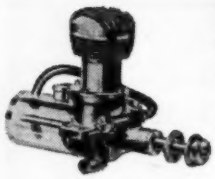

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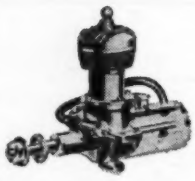

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## Flea Fright

(*Continued from page* 11)

splitting tendencies. The butterfly tail should be set at 0°. Care must be taken to insure a steady mount to prevent any slippage, as this would act as rudder adjustment.

After the pylon keel is glued in position, add the formers and 3/16" sheet wing mount. As the pylon is of faired silk design, take care to undercut all formers and bevel all edges to insure an undisturbed covering job. If silk is not available, wet Silkspan, double covered, will serve equally well.

At this point it is wise to lightly tack in place the balsa block for the upper section of the pod with glue. Once this has dried sufficiently to work on, carve it to the proper crossection and then remove for hollowing. Cut a removable hatch, as shown on side view, to provide access to the ballast compartment as well as a dethermalizer timer, or automatic cutoff timer. Key the hatch in place with small dowels.

An *Austin* timer was used in the original ship for the automatic release, which is quite simple to make. Permanently mounted in the forward section of the nose, an elongated L shaped piece of 3/32" wire serves as the tow hook. Directly above this hook, a second piece of 3/32" wire is connected to the timer shaft. Solder a small washer to the base of the tow hook and attach a small length of coil spring to it. Fasten a nut to the towline and flip this nut over the tow hook, compressing the spring. When the timer shaft is extended, the receding shaft attached to it will also extend over the nut on the towline. After the predetermined setting has been reached, the nut is released, the coil spring throws the towline clear, and the glider, detached from the gas job, is free to test its own wings.

This, with the addition of fillets and wing hooks, celluloid cabin and a little elbow grease, winds up construction on the *Flea's* fuselage.

The last main piece of construction between a messed up workshop and the hours at the old flying field, is the *Fright's* fuselage. Construction is plentiful but not difficult, and the obvious place to start is the crutch. This is laid out in conventional manner, from selected wood. It is necessary to splice the crutch, as most balsa is sold in 36" lengths. Take time to make a good joint, and double coat the surfaces before joining.

While the crutch is drying, don't run out for an ice cold soda—there's plenty more work for you. Better get busy on the formers. The firewall and several typical formers are shown on the fuselage plate. Remaining formers not shown follow the pattern of F-6. The best way of plotting the formers is directly on the balsa sheet. Merely scribe a circle, the maximum width of the crutch, for each station. Add the centerlines for reference points and proceed to mark off the 1/8" x 1/4" top and bottom keels, and the crutch longerons. It will help considerably to scribe a second circle 1/4" smaller than the first; this marks the depth of the stringer and crutch notches to be cut. A third circle, 1/8" inside the first, will serve as the actual cut size of the former, for as you will note the formers are all undercut to allow a smooth covering contour.

The remaining three stringers in each quadrant may best be located with a pair of dividers. By trial and error, divide each former section from crutch to top


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or bottom 1/8" x 1/4" keel into four sections, with 3/8" left over. Using the same setting on the dividers, mark the section off again allowing 1/8" for each stringer, and everything will come out even. It's not as hard as it sounds.

Note that the stringers continue up to the firewall to insure an almost indestructible fuselage. It is not really necessary to cut all the upper stringers through the plywood firewall. On the bottom, yes, but a butt joint will serve very well for the rest. Suit yourself.

The pylon keel is laminated from 1/8" sheet, grain running in opposite directions. This extends down to the crutch and back to former F-5. Cut a section free to accommodate the battery box. Once this is glued in place, with the formers holding it in position, the wing mount platform of 1/4" sheet is glued on. Note that this platform is built up to support the wing, beneath the spars.

Not much more work can be done until the landing gear and tail wheel are installed. The gear itself is optional, but if you wish to use the plane for towing the glider it becomes necessary. Otherwise, a one wheel gear or what have you can be substituted. I wouldn't worry too much about the extra drag, because the ship has an uncomfortable habit of leaving for the next state anyway. The original gear was of conventional nature, strapped and bolted to the firewall, and plywood reinforced F-1. The tail wheel wire was likewise strapped and bolted to a plywood piece under the crutch. A laminated subrudder notched to receive the 1/16" tail wheel wire will make a neat job out of it.

If a conventional ignition system is to be used, locate the coil, condenser and timer between sections F and F-1. Keep all wires as short as possible; a neat job in this phase of construction is always rewarded with trouble-free performance later on. In the original ship the flight timer, needle valve, and ignition timer advance arm were all mounted at left of the ship, for the sake of convenience in the last minute tune-up. On a large ship it's a trifle hard to reach around to the other side for an adjustment when the model is about to be launched.

A dethermalizer timer was installed in the original ship forward of F-5. Some characters consider a dethermalizer a useless piece of paraphernalia, but when your ship is a couple of thousand feet up and going strong it's quite a nice feeling to see that timer kick the tail up 40° and mush your hard earned engine, to say nothing of your labor, back to the ground. So far it's been used over 20 times on the original.

Installation is fairly simple: the timer may be set prone in the fuselage, or accessible as in this model. When installed in the side, a retracting "U" shaped wire on the timer releases a spring loaded wire engaging the tail hook. Rubber tension then raises the tail assembly, and a chord stops it at 40°. It is important that the tail be held firmly in position against the leading edge stop, as a loose tail can throw the plane into a spin. There is absolutely no danger if this is observed: the plane will mush down vertically, about a thousand feet a minute, and land with a slight jar, but on its own three wheels. (No cracks!)

Assuming all the entrails are stashed away, 'tis time the stringers, planking, fillets and other details are attended to. This will leave you only with the task of cowling your powerplant. Of course this will depend somewhat on which engine you choose. For a *Super Cyce*, the upper

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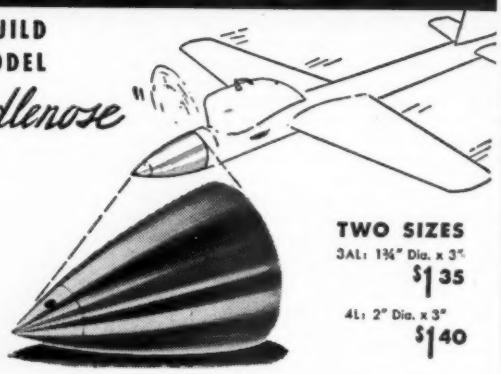

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cowl was removable from the centerline of the engine forward; the engine mounts bolted to the crutch made removal a cinch. With slight modifications the same system may be used for other engines. Notice the engine is set at 0° downthrust. This worked perfectly, though each individual ship might need side thrust adjustment. 6° positive incidence in the wing and 4° in the tail compensate for the lack of downthrust, permitting prop wash straight back on the fuselage.

The fuselages of both models were covered with silk, which is ideal for this type of pylon. If it is unavailable, use wet Silkspan. Incidently, war surplus 16 ft. flare parachutes may be purchased in many areas for a few dollars. Pure lightweight China silk is used in this particular type, identical to the grade sold in pre-war days by most model shops.

Now that all construction is completed for both the *Flea* and the *Fright*, I shall attempt to give you as detailed an account of the flying procedure as possible. Obviously, towing a large glider behind a blustering gas job is a trifle tricky and requires careful trimming.

First of all, for those who have never tried a butterfly tail, the adjusting is easy as long as you remember to treat a trim tab as a rudder tab rather than a simulated aileron. If an aluminum tab is put on either side of the trailing edge and both are raised equally, it will act as incidence, both depressed, as lack of it. If the left tab is raised it will increase incidence and add right turn, and vice versa. To add turn and maintain constant incidence, raise one and lower the other in equal amounts; the model will turn toward the side of the lowered tab. Always remember, however, that a turning model requires more incidence than for a straight flight adjustment.

Test glide the gas job until you are reasonably certain there is no disturbing turn or stall. About the best and safest way I know of testing a large ship is to give it as little power as possible on its first few flights, and trotting underneath it should anything go wrong. In that way the only danger the plane will face is a broken prop when it hits you in the head!

The model shown here flew right off the drawing board with no changes at all, not even turn. When wide open it climbed in a steep left spiral, falling into a left circle. Some will shy away in horror at mention of this, but no ill effects have been suffered. This combination of climb and glide removes the dip at the end of the motor run, and also avoids a change of direction when towing the glider. A left climb, and a right glide have also been used—it's purely a matter of side thrust, warps and adjustment.

Thoroughly test the gas job under all power conditions before attempting any towing operations. I suggest you try a few unassisted takeoffs, with engine fully retarded, running very rich. With the engine so throttled down it will take a run of about 150 ft. to become airborne. Allow a minute or so motor run. Adjust the model for a large circle, either left or right, and gradually experiment with small increases in power. Once satisfied with your findings, proceed to test the towline glider's flight characteristics.

The *Flea* must now be tested very carefully from one end to the other, and every trait must be taken into consideration. Balance the model and test glide it before experimenting with normal towline launches. A heavy duty bank pin will serve nicely as a tow hook, and has the advantage of being readily removable to a new setting.

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Tow the model by hand until proper adjustment is obtained; find the direction in which the model prefers to turn and check to see if it has a tendency to spin in this direction under accelerated flight conditions. If so, add a trim tab to that wing to create a little more lift. Next, re-adjust the towline to simulate the flight path under power of the gas job. Both models must turn in the same direction, circles coinciding as close as possible. As the gas job is faster than the towline under any conditions a nose down attitude for the glider is advisable. Do not forget the increased speed of the glider under towed flight will accentuate its weakest turning side, unless precautions are taken.

It is needless to warn you to pick a calm day for the first combined flight tests, as being a model builder in the first place you will in all probability try it in a 25 mile an hour gale (see flight photo—I'm crazy too).

Best results were obtained by fastening a 25 ft. line to either the top of the pylon or the base of the pylon, preferably the latter as it will have the least effect on the gas job in that location. A short length of 1/4" rubber helps absorb any rough movements of the glider.

Adjust the automatic release on the glider for about 5 seconds flight time at first—should anything go wrong it will prevent that old crunching noise.

Now that you are all set to duplicate "McGovern's Folly," all you need is a prayer. Prepare the gas job for an assisted takeoff, the towliner to be hand launched by an assistant. When all set, give the gas job about a one minute engine run at very low power, just a trifle more than necessary to get it off the ground with the extra drag of the glider in tow. Guide the wingtip until the gas job rises under its own power; run along with it, but don't drag it into the air. It will take time to accelerate with a pound of glider behind it.

As it rises from the ground, hang on to your hat! You are in for a thrill that will repay all your hours of work!

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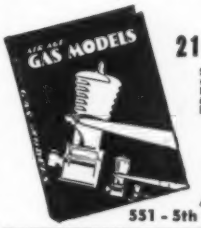


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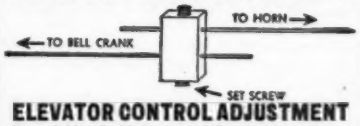


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## Radio Control Kinks

(*Continued from page 20*)

section of this unit is a regular 7-prong miniature tube socket of either the molded or wafer type. Since these sockets are made for miniature tubes and there are no regular plugs made to fit the sockets, why not use a miniature tube base for the plug? Take any burned out miniature tube and *carefully* crack the glass away for about 1/8" from the bottom. The ragged edges can be smoothed down on a grinding wheel. After the glass base with the prongs is free of the internal connections, solder thin insulated wire to each short prong, color-coded wire preferred. Then mold plastic wood around the wires and on the base to form a neat looking plug, with perhaps a small finger grip to facilitate handling. This makes an ideal booster plug and jack arrangement, where 5 or more separate voltages may be needed at the same time. It can be used in the plane also as a quick-disconnect feature on the receiver. Make proper battery connections to the socket and then wire the receiver and relay connections to the plug. In this way the entire receiver can be connected and disconnected with absolutely no trouble and with no loose wires dangling around.

In closing, we would like to stress again the importance of neat and "uncomplicated" wiring. At a recent meet a contestant lost control of his radio job just as he was doing an excellent job of maneuvering. Fortunately the plane was recovered and no damage incurred. The trouble was caused by a wire that had come loose from its connection. Use Fahnstock clips or the plug arrangement just described, and make sure all connections are properly soldered. Be sure the batteries you use are fresh and check them from time to time, preferably under load, to make sure they do not fall less than 10% under their rated voltage. 10% under the rated voltage of a battery is a good conservative figure for efficient operation.

Keep plane batteries firmly anchored, since they will do quite a bit of damage if knocked loose in a hard landing or crash. All in all, radio control is doing quite well considering restrictions imposed on this fascinating phase of model building. Some day, and we hope it will be soon, we'll have regular "National Air Races" with radio controlled models making ground pickups and cutting pylons. At present the model builder can help himself and model aviation in general if he concentrates on developing new methods of mounting receivers, making battery boxes (it's not as simple as buying a readymade battery box) and working out new mechanical control devices.

## Model De HI

(*Continued from page 21*)

common clothes' snaps. Mount the prop and put in 6 or 8 strands of 3/16" flat rubber.

Try a test glide on a calm day, in tall grass if possible, and make any adjustments necessary. The original was balanced perfectly as built, but due to varying materials another model may need slight adjustments. When the ship has a good glide, give the rubber a few turns and try your luck on a powered flight. There's your model, and good flying!


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## Recent Racing Engines

(*Continued from page 25*)

piston rings and cylinder liner are made of steel, the latter being case hardened. The maker claims steel rings have more elasticity than the usual cast iron rings and therefore provide a better seal. The cylinder liner is honed to very high finish and close tolerances, and the piston rings are lapped to fit. Certain components of the engine, such as the aluminum alloy cylinder head, are cast by a special process developed by the manufacturer which practically eliminates blow holes and improves the appearance of the parts when machined to a finish.

Of particular interest is the many problems that had to be solved when carrying the engine speed above the normal, even for racing engines. It was found that the usual timer in which the points are open during half the revolution and closed during the other half failed to give satisfactory ignition unless the battery voltage was increased to 4-1/2. The difficulty was overcome by use of a special cam that holds the points closed for a longer period and thus provides more time for the primary current to build up. The timer is flange-mounted and has two spring shoes to prevent slippage of the spark setting, which is manually adjustable while the engine is running. The support obtained with flange mounting prevents variation in the point setting; points and spaced only .004" apart.

It was also found that the diameter of the tube on the carburetor to which the fuel line connects had to be increased 50% to deliver sufficient fuel at speeds above 18,000 rpm. Some increase in the diameter of the crankshaft passage which conducts the fuel mixture from the rotary valve to the crankcase also was necessary. The up-draft carburetor is made of finished brass, and extensive experiments were conducted to determine the venturi diameter that would provide optimum performance. Too small a venturi limits the maximum speed of the engine, and one that is too large tends to cause unstable running.

When engine speed is being carried above normal it has been found that attention to details is important. In disk-type rotary valve engines any tendency to end-play in the lower rod-bearing is checked by the disk; but when a shaft-type rotary valve is used no means of preventing crankpin bearing end-play usually is provided. In the *Bungay* engine a steel disk cast in one end of the aluminum alloy crankcase was found to be a simple and effective means of preventing end-play in the lower rod-bearing.

After experiments with cylinder compression ratios ranging all the way up to 18 to 1, a ratio of 9.80 was adopted.

The bypass runs directly to the crankcase, but there are also auxiliary ports in the lower part of the cylinder and piston skirt as are used in a few other racing engines to facilitate induction.

With the bore of .940" and stroke of .875", the displacement of the *Bungay* is .607 cu. in. The engine weighs 16¼ oz. with all equipment except the coil, condenser, battery and fuel tank. It may be operated at full speed at once, no breaking-in period being necessary.

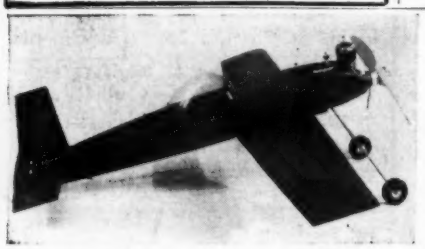
The specifications of the *Ball* .604 cu. in. racing engine were published in a previous issue, but as this engine had just been placed on the market no description of its important design features could be included in the text of the article. I have since had the opportunity of examining and running the *Ball*, and find it another outstanding example of recent advances in racing engine design. After having seen (and heard) the *Bungay* and *Ball* in operation, my conclusion is that both are dynamite with regard to power and speed.

The manufacturer informed me that on the test stand the *Ball* reaches peak power at 16,000 rpm with a 12-6 prop cut down to a diameter of 9". A test conducted with such a prop fully verified the claim. With smaller propellers higher speeds were obtained. The engine was operated on a fuel mixture of 3 parts methanol and 1 part castor oil as specified by the maker.

With the object of increasing volumetric efficiency, the cylinder of the *Ball* engine is provided with double bypassing and double exhaust porting. There are 6 exhaust ports in the honed Meehanite cylinder liner, which number is not unusual for racing engines; but there are also 6 inlet ports, which is more than usual. The total inlet port area is .1186 sq. in. Each of the two exhaust stacks receives the discharge from three exhaust ports. An advantage of dual bypassing is that the cylinder may be reversed for convenient mounting in the airplane.

A distinctive feature of the *Ball* carburetor is the unusually long throat, which is stated to provide a reserve charge between the jet and the rotary valve which in turn gives a smoother action at the jet. A special type of jet is designed to provide better atomizing of the fuel, with less obstruction, an innovation that is more costly to build, but considered worth while.

It is stated a shaft-type rotary valve is used because it involves less friction than

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other types. This valve opens 50° after lower dead center and closes 70° after upper dead center, thus being open during 200° of crankshaft rotation.

The aluminum alloy crankcase is divided vertically in the transverse axis of the engine and is of very compact design. No gasket is used between the two halves of the crankcase or between the cylinder and head. The compression ratio of the *Ball* is 10 to 1, and it is stated that for peak performance under certain climatic conditions it may be necessary to insert an extra gasket between the cylinder and crankcase to lower the ratio slightly.

Because of dual bypassing, the domed head of the cast aluminum alloy piston is provided with two deflectors. Two piston rings are used. The connecting rod is machined from 24S-T aluminum, which is stated to insure freedom from stress fractures. Two radial ballbearings support the crankshaft, which is machined from heat treated chrome-nickel steel.

Because the rotary valve is open over such a wide range of shaft rotation, there is some blowback of the charge through the inlet at speeds below 15,000 rpm and so it is necessary to mount the fuel tank close to the engine for best operation. Glow-plug ignition may be used if desired.

## Flash News

(*Continued from page* 1)

"all-weather" design but is powered by two turbojet engines lying side-by-side in the belly. The Vought F7U is a "flying wing" jet-rocket fighter with breathtaking performance. Better known is the Grumman F9F *Panther*, of which the Navy bought 317 more bringing the total to 417 of the type. This airplane can use either the Pratt & Whitney *Nene* or the Allison 400 turbojet engines. Production will be split about half between the two engines but they will be completely interchangeable in service. The McDonnell F2D *Banshee* finally hit the production trail with a Navy commitment for 179, bringing the total on order to 235 of the type, a gently "blown-up" version of the popular FD-1 *Phantom* now in carrier squadron service.

IN THE NAVY ATTACK category the two old work horses—Douglas *Sky Raider* and *Martin Mauler*—continued their production with orders being placed for 356 Douglas AD-2 and 47 Martin AM-2 divebombers. This Douglas order brings the total to 479 of Navy orders for the craft, a clear-cut indication of Navy esteem for this rugged plane with its unique fuselage dive brakes. Martin now has 210 of these powerful "beasts" in production and squadron service tests aboard carrier have already been completed on AM-1's previously delivered. The new models will be equipped with "spoiler panels" on the upper wing surface to assist ailerons in giving the huge craft an even faster rate-of-roll for combat. The *Mauler* is powered by a Pratt & Whitney R-4360 *Wasp Major* engine of 3500 hp. Grumman, however, will enter the attack category with a contract for 23 model AF-1 aircraft. This new type features a side-by-side seating arrangement for its two-man crew. It will be used for long range radar search and anti-submarine warfare duties.

TRANSPORT FIGURE IS NOT YET complete with many more orders to come but significant orders have been placed. For example, the Fairchild *Packet* C-119 was assured continued production by an increase of 99 new planes to the existing contract for 37, or a total of 136 for the type. The C-119 is the familiar C-82 *Packet* but features huge Pratt & Whitney *Wasp Major* engines of 3250 hp and location of the flight crew forward in the nose instead of high atop the "box" as in earlier version. Navy finally broke the ice and will get 8 *Packets*, which they are going to call R4Q-1 in accordance with their peculiar




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**Class B**

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| *Forster 29 | 14.85 |
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| *Ohlsson 23 (rotary valve) | 10.95 |
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| | |
|---|---|
| Forster 305 | 14.85 |
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| | |
|---|---|
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| *Dennymite | 6.95 |
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| *McCoy 60 | 22.50 |
| *OK Super 60 | 18.00 |
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| *Sportsman Sr. | 16.95 |
| *Super Cyclone (single ign.) | 18.95 |
| *Super Cyclone (twin ign.) | 19.95 |
| *Super Champion | 17.50 |
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**Class E**

| | |
|---|---|
| *Forster 99 | 24.75 |
| *OK Twin | 49.00 |
| *less coil, condenser | - |

### GLOW ENGINES

| | |
|---|---|
| Ohlsson 19 kit | 8.95 |
| Ohlsson 19 | 9.95 |
| Ohlsson 23 kit | 8.95 |
| Ohlsson 23 | 9.95 |
| OK Hothead | 12.50 |
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| Atwood Glo-Devil | 15.00 |
| Glo-Mite | 14.50 |

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| Drone B | 14.95 |
| Air-O | 16.50 |
| Decail A | 12.95 |

### JET ENGINES

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| Dyna-Jet Racing | 35.00 |

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|---|---|
| OK CO2 Engine | 4.95 |
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|---|---|
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| #3 AL 1¾" | $1.20 |
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| **Standard** | |
| #1¾" Dia. | .30 |
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| #3A 1¾" Dia. | .85 |
| #4 2" Dia. | 1.00 |
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**SPONGE RUBBER - WHEELS**

| | |
|---|---|
| 2" dia. | .40c |
| 2½" dia. | .50c |
| 3½" dia. | .60c |

**ALUM. TUBING**

| Dia. per ft. | |
|---|---|
| 1/16" | 10c |
| 3/32" | 10c |
| ⅛" | 12c |
| 5/32" | 12c |
| 3/16" | 15c |
| ¼" | 18c |

**GLO-PLUGS**

| | |
|---|---|
| Arden Glow Plug | .85 |
| Hot Point Plug | .85 |
| Ohlsson Glow Plug | .85 |

**MISCEL.**

| | |
|---|---|
| Silkspan 00 | .05 |
| Silkspan GM 3 for | .25 |
| Nylon sq. yd. | 1.15 |

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| | |
|---|---|
| ⅛" flat, per ft | $ .01 |
| 3/16 flat, per ft | .01½ |
| ¼" flat, per ft | .02 |
| Rubber Lube 1oz. | .15 |

**IGNITION**

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|---|---|
| Aero Cond. | .35 |
| Smith Cond. | .35 |
| Paper Cond. | .25 |
| Austin Timer | 1.20 |
| Aero Timer | 1.85 |
| Airco Timer | 2.30 |
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| Slide Switch | .30¢ |
| Tip Jack | 12¢ |
| Pee Wee Clip | 10¢ |
| Alligator clip | 10¢ |

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| | |
|---|---|
| Maeco Tank | 1.00 |

**FROOM TANKS**

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|---|---|
| #1 1½ x 1½ Horizontal | .90 |
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| #3 1¼ x 1½ Vertical | .90 |
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|---|---|
| 2½" dia. pr | .82.15 |
| 3½" dia. pr | 2.50 |
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**VECO WHEELS (With Turned Alum. Hubs)**

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|---|---|
| ¾" dia. | .20¢ pr. |
| 1¼" dia. | .25¢ pr. |
| 1¾" dia. | .30¢ pr. |
| 1¾" dia. | .50¢ pr. |
| 2¾" dia. | .60¢ pr. |

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|---|---|
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| 16" & 18" | .75 |
| Hi-Ball (High Pitch) 9" to 14" ea. | .35 |

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|---|---|
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| 12" to 14" | .60 |

**Hi-Thrust**

| Dia. | 6" or 8" pitch | 10" pitch |
|---|---|---|
| 8" to 11" | 50¢ | 60¢ |
| 12" to 14" | 60¢ | 70¢ |

7-3 and 8-3 propellers ..... 35¢

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| | |
|---|---|
| Universal Needle Valve | 60¢ |
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| ¼" or ¾" spark plug gasket. 2 | 5¢ |
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| Diesel Conversion Arden .099 | 3.00 |
| Arden .199 | 3.50 |
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| Reggie Pink Fuel qt. | 1.25 |
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**CONTROL ACCESSORIES**

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|---|---|
| Two Speed Supplies Electraline Wire, .011 or .014" dia., 150 ft. | 1.50 |
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| Ohlsson 2-Speed Points | 1.75 |
| Veco Bellcrank | .25¢ |
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|---|---|
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| 1/16 x ⅛ | .5¢ |
| 1/16 x 3/16 | 4.5¢ |
| 1/16 x ¼ | .1¢ |
| 1/16 x ⅜ | 4 .5¢ |
| 1/16 x ½ | .2¢ |
| 3/32 x 3/32 | 6 .5¢ |
| 3/32 x 3/16 | .1¢ |
| 3/32 x ¼ | 3 .5¢ |
| 3/32 x ⅜ | .2¢ |
| 3/32 x ½ | 2½¢ |
| ⅛ x ⅛ | .5¢ |
| ⅛ x 3/16 | 3 .5¢ |
| ⅛ x ¼ | 2 .5¢ |
| ⅛ x ⅜ | .3¢ |
| ⅛ x ½ | .4¢ |
| ⅛ x ¾ | .5¢ |
| ⅛ x 1 | .6¢ |
| 3/16 x 3/16 | .4¢ |
| 3/16 x ¼ | .4¢ |
| 3/16 x ⅜ | .5¢ |
| 3/16 x ½ | .6¢ |
| 3/16 x ¾ | .8¢ |
| 3/16 x 1 | .9¢ |
| ¼ x ¼ | .4¢ |
| ¼ x ⅜ | .5¢ |
| ¼ x ½ | .6¢ |
| ¼ x ¾ | .10¢ |
| ¼ x 1 | .12¢ |
| 5/16 x 5/16 | .5¢ |
| 5/16 x ⅜ | .6¢ |
| 5/16 x ½ | .8¢ |
| 5/16 x ¾ | .12¢ |
| 5/16 x 1 | .7¢ |
| ⅜ x ⅜ | .10¢ |
| ⅜ x ½ | 12¢ |
| ⅜ x ¾ | 10¢ |
| ⅜ x 1 | 15¢ |
| ½ x ½ | .9¢ |
| ½ x ¾ | .12¢ |
| ½ x 1 | .18¢ |
| ¾ x ¾ | .14¢ |
| ¾ x 1 | .18¢ |
| 1 x 1 | .24¢ |
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| 1/16 x 2 | 7¢ |
| 3/32 x 2 | 8¢ |
| ¼ x 2 | 9¢ |
| ¼ x 3 | 14¢ |
| ⅜ x 2 | 11¢ |
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| ½ x 2 | 14¢ |
| ½ x 3 | 21¢ |
| ¾ x 2 | 19¢ |
| ¾ x 3 | 27¢ |

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| 3/16 x 3 | 17¢ |

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**Complete Kit** includes prefabricated parts; complete metal fittings, including bellcrank, elevator horn, gas tank, and fuel line parts.

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system. The Douglas DC-7 made the list with an order for 28 model C-124A transports, an improved version of the C-74 *Globemaster*. The new airplane is basically the C-74 but with a new and greatly inflated fuselage carrying 50,000 lb. payload.

It will feature huge nose loading doors looking for all the world like the doors on a Navy LST used during the war for assault landings. The familiar double "bug eye" canopies used on the C-74 for pilot and co-pilot have been given up in favor of a single canopy. Reason, believe it or not, was sheer "lonesomeness" on part of the pilot and co-pilot who rode with their heads projecting up into individual "bug eye" enclosures on either side of the nose. They could not see each other in flight and rode their lonesome way. Now, there'll be the good ole-fashioned custom of setting her on automatic pilot and the relaxation of a "bull session" in flight, so familiar to multi-engine flight crews on long hops. Grumman entered the Air Force's list with its new XJR2F-1 "Albatross" amphibian, designed for the Navy. Air Force bought 32 of them, designated SA-16 and indicating search-rescue-amphibian in the new Air Force jargon. But the Navy exercised its prerogative and ordered 6 of the type.

HELICOPTER ORDERS fell into one basket, that of Sikorsky Division of United Aircraft Corp. with orders for 19 model HJS and 18 HO3S types for the Navy. The new HJS model is especially designed for operation from cruisers and battleships taking the place of VO, VS and VSO fixed wing Navy types used for more than 20 years for the purpose. The tail rotor has been placed high on a pedestal to clear the various items of equipment scattered about cruiser and battleship turrets and deck, strengthened landing gear and revised nose canopy.

PATROL PLANES, WHICH ARE informally termed "search" planes in the Navy, continue increasingly towards the land-type exclusively. Lockheed received an increase of 82 in its production order for the P2V *Neptune*, more familiarly known as the "Truculent Turtle," world long-distance record holder. These are divided between P2V-3 and P2V-4, the latter rumored to be powered by Allison T-40 turboprop units. Martin received an increase in its order for the P4M *Mercator* search plane featuring combination propeller and turbojet power. The 12 new planes bring the total to 19 with the last expected for delivery late in 1950. Coming up is the Convair P5Y powered by the Allison T-40 turboprop engine and a large version of the Martin P5M flyingboat with planing tail hull, a new design affording improvements in water handling characteristics which reduce takeoff run and improve the plane's rough-water stability.

BUT THESE ORDERS are not all to come this year, Secretary of Defense Forrestal and President Truman holding up about $300,000,000 until the program can be reviewed in September, and again in December. Idea is that the President wants to make certain these expenditures will not impair the economic stability of the country under the new reduced income-tax level. But these orders are a substantial start on the 70-Group Air Force and the 24-Air Group Naval Aviation scheduled for 1950-52, depending on subsequent appropriations by future Congresses. There is no doubt, however, that the new program returns the aircraft industry to a solid foundation and will permit it to expand rapidly and soundly in the event of gathering war clouds. The United States is assured of a return to its wartime place of First in the Air throughout the world.

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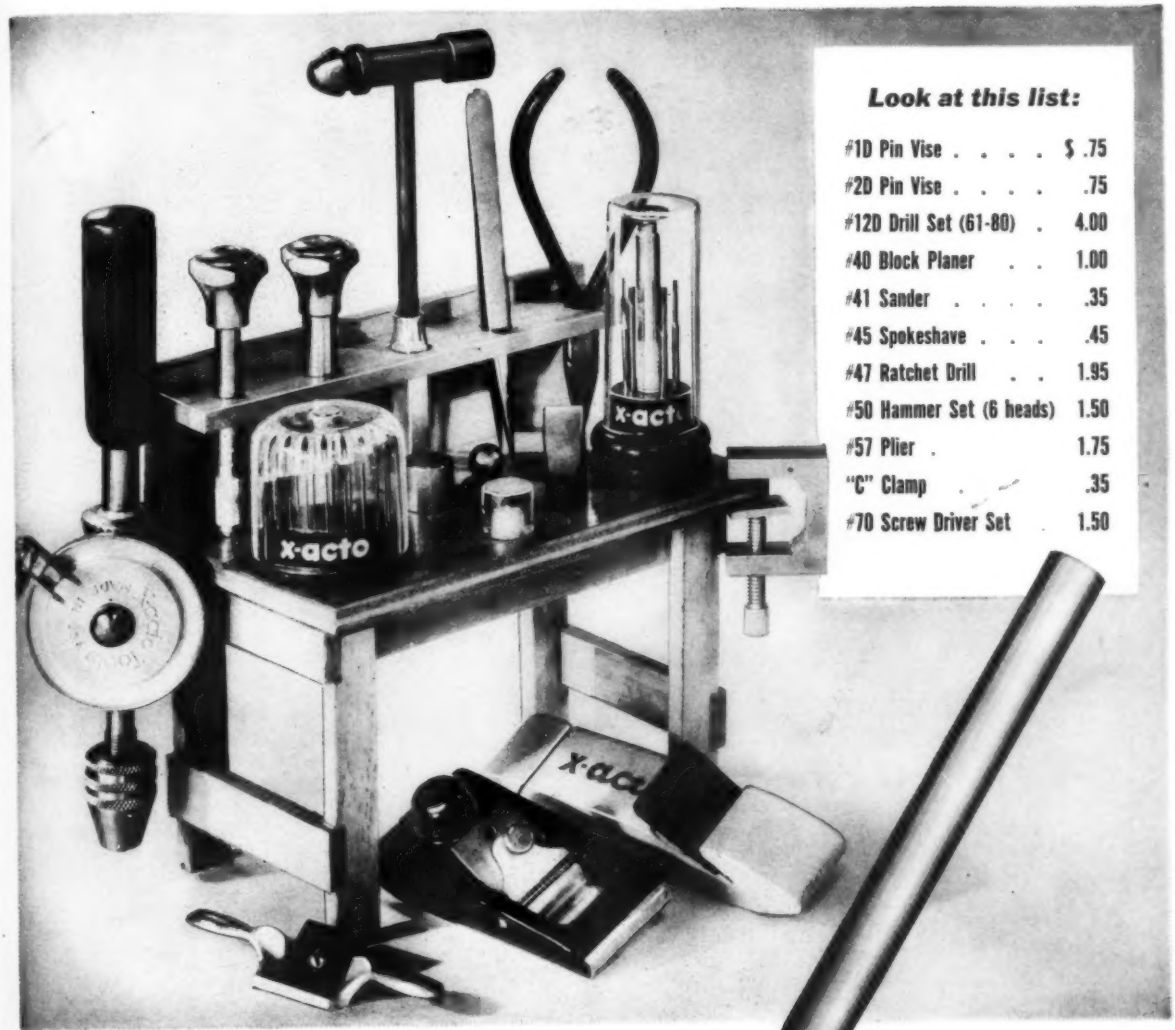


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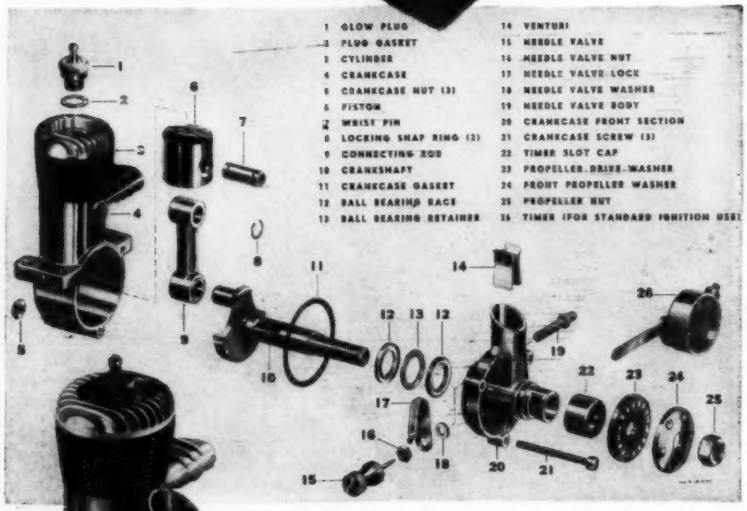


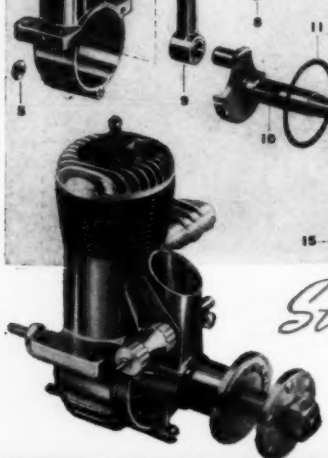

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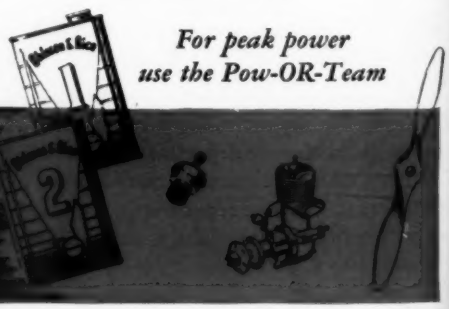

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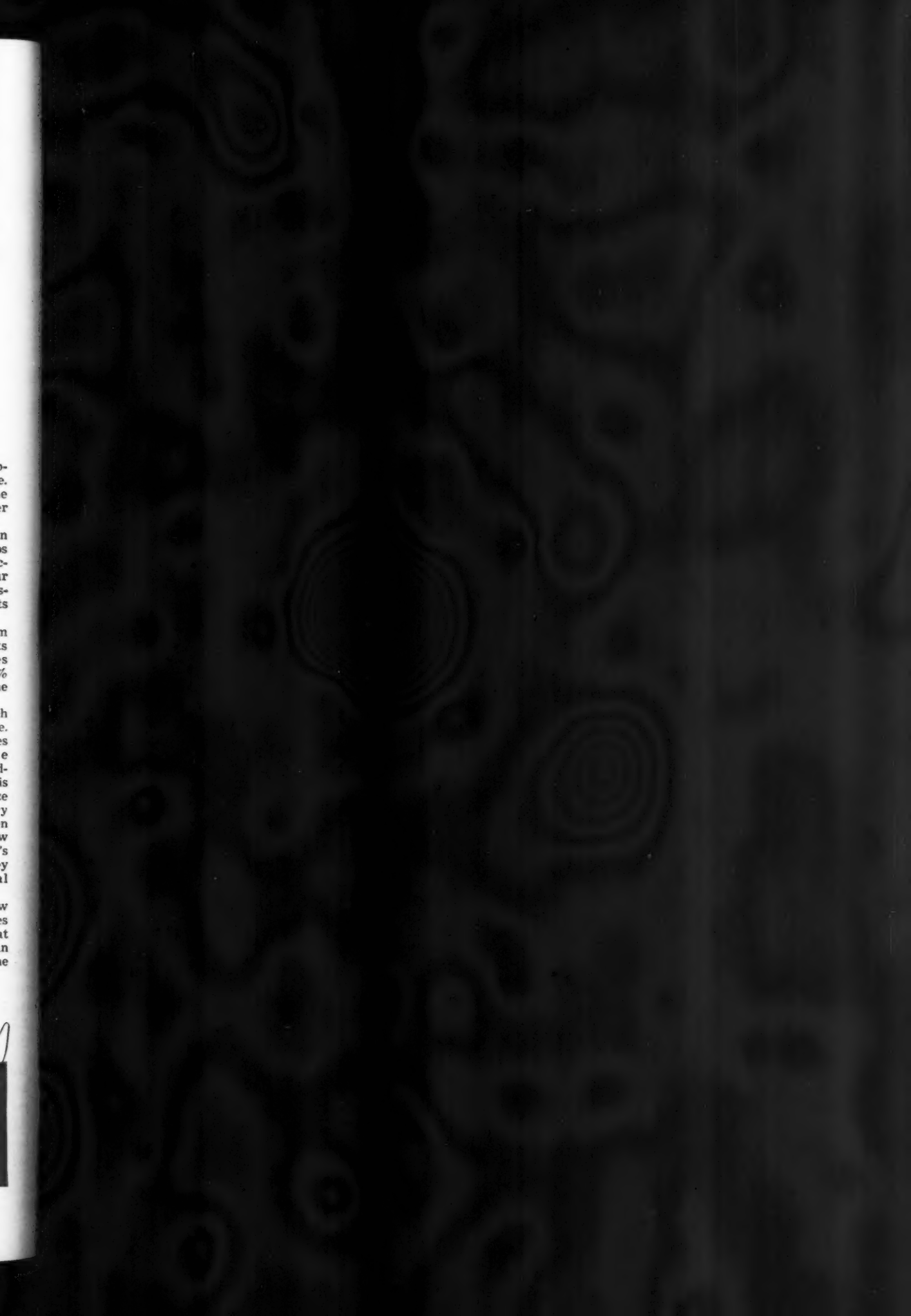
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